



# **PLANT BREEDING ABSTRACTS**

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*Note:—*Initialed review written by:—

Mrs. R. H. Richens .. .. . R. H. R.

\* General studies, see also individual crops.



# Plant Breeding Abstracts

Vol. XXV, No. 4

C. A. B.

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FILE

## \*STATISTICS

2547 COCHRAN, W. G.

### **The combination of estimates from different experiments.**

Biometrics 1954 : 10 : 121-29.

Methods for combining a number of estimates  $x_1$  of some quantity  $N_1$  made in different experiments are discussed. For the  $i^{\text{th}}$  estimate we have an unbiased estimate  $s_1^2$  of its variance, based on  $n_1$  degrees of freedom. If the experiments are of the same type and the  $x_1$ 's are of equal precision then the unweighted mean  $\bar{x}$  is in general the best estimate. The second case considered is that in which the experiments are of different types but the variance  $\sigma_0^2$  per observation is the same in all experiments; the variance of  $\bar{x}$  is then  $\sigma_0^2/f_1$  where  $f_1$  is the number of observations making up  $x_1$ . If no interaction exists the best combined estimate is  $\Sigma f_1 x_1 / \Sigma f_1$ ; if interaction is present, the choice lies between the unweighted and semiweighted mean; recommendations are given. Experiments in which the variance per observation is not constant are the most frequent in practice; working rules to aid the selection of an estimate are provided.

2548 KIMBALL, A. W.

### **Short cut formulas for the exact partition of $\chi^2$ in contingency tables.**

Biometrics 1954 : 10 : 452-58.

The author states the formulae for partitioning the total  $\chi^2$  for an  $r \times s$  contingency table into  $(r-1)(s-1)$  individual  $\chi^2$ 's with one degree of freedom.

2549 BRIEGER, F. G.

### **Análise da variação qualitativa em amostras pequenas. (Analysis of qualitative variation in small samples).**

An. Esc. Agric. Queiroz 1948 : 5 : 35-63.

The limits within which normal or Poisson distributions can be used instead of the binomial distribution in statistical analyses of qualitative variation in small samples are elucidated. The author also examines under what circumstances and with restrictions the  $\chi^2$  test can be applied.

2550 BRIEGER, F. G.

### **A determinação dos números de indivíduos mínimos necessários na experimentação genética. (The determination of the minimum number of individuals necessary in genetical experimentation).**

An. Esc. Agric. Queiroz 1947 : 4 : 217-62.

A general binomial formula stating the minimum number of individuals or replications necessary in order to guarantee that an experiment is being conducted with a given degree of precision is presented. Approximate formulae based on the normal and Poisson distributions are also given; these involve less computation.

It is pointed out, however, that in many genetical experiments, for instance, an experiment to secure a particular genetic recombinant, success may be achieved with less individuals or replications than the theoretical minimum number. A method of partial progressive testing in which an experiment is commenced with less than the minimum number of individuals or replications and continued with increasing numbers till the theoretical minimum is reached is outlined to deal with this kind of situation.

2551 SOMERVILLE, P. N.

### **Some problems of optimum sampling.**

Biometrika 1954 : 41 : 420-29.

An experimenter is asked which of  $k+1$  populations has the largest mean and must decide how large a sample he should take to decide this question. In this paper, loss functions are set up which take into consideration the amount of use to be made of the results, the cost of a wrong decision and the cost of sampling. A method of minimizing the maximum expected loss with respect to the sample size is proved under certain restrictions. One-stage and two-stage sampling are discussed.

2552 BANKS, C.

### **The factorial analysis of crop productivity.**

J.R. statist. Soc. 1954 : Ser. B. : 16 : 100-11.

It is shown how the methods of factorial analysis

\* General studies, see also individual crops.



developed by psychologists may be usefully applied to agricultural data, in order to deal with such problems as crop productivity.

2553 CALVIN, L. D.

**Doubly balanced incomplete block designs for experiments in which the treatment effects are correlated.**

Biometrics 1954 : 10 : 61-88.

In a balanced incomplete block design,  $p$  treatments are tested in  $q$  blocks of  $k$  units such that each pair of treatments occurs together an equal number of times ( $\lambda$ ). The standard analysis of this design ignores the possibility of correlation among observations within a block. The present paper takes this into account, and shows that the analysis is much simplified by imposing the further condition that each triplet of treatments must occur together equally often. This design is known as a doubly balanced incomplete block. The author recommends that for this design the number of treatments to be tested should be less than twenty. The paper considers methods of constructing doubly balanced incomplete block designs and points out that any limitation in the number of replications should not reduce the number below fifty.

2554 ABELSON, R. M. & BRADLEY, R. A.

**A 2 x 2 factorial with paired comparisons.**

Biometrics 1954 : 10 : 487-502.

Treatments that form a factorial set in paired comparisons are considered. The case of a  $2 \times 2$  factorial experiment is discussed in detail. If  $A$  and  $B$  are the two factors having effects  $\alpha_1, \alpha_2$  and  $\beta_1, \beta_2$  at the two levels, maximum likelihood estimates of the  $\alpha_1$  and  $\beta_1$  are obtained under various hypotheses [e.g.  $H_1 (\alpha_1 = \alpha_2, \beta_1 = \beta_2)$ ]. The tests of these hypotheses are approximate tests based on the distribution of the logarithms of the likelihood ratio statistics. They lead to an approximate  $\chi^2$  test. A complete table of test procedures for the  $2 \times 2$  case is given, listing the test, hypotheses and the test statistic with its degrees of freedom. A numerical example is provided.

2555 GRAYBILL, F.

**Variance heterogeneity in a randomized block design.**

Biometrics 1954 : 10 : 516-20.

An exact test of equality of treatments in a randomized block design is given when the error variances differ between treatments and the errors are correlated within a block but are independent between blocks. An example based on a wheat varietal test is given.

2556 MEIER, P.

**Analysis of simple lattice designs with unequal sets of replications.**

J. Amer. statist. Ass. 1954 : 49 : 786-813.

The case of the square lattice with only two replication patterns is considered. The replications following one pattern are called  $X$  replications and those following the other pattern are called  $Y$  replications. A design using  $n$   $X$  replications and  $m$   $Y$  replications is referred to as an  $(n, m)$  design. The full analysis of this design is presented, leading to an analysis of variance. A simple but approximate test of significance is given and also an exact test. A method of estimating varietal means is given, also a method of finding the variances of varietal differences. The efficiency of this design is discussed, using the reciprocal of the average variance of all possible comparisons. A maize trial is used as a numerical example.

2557 COX, D. R.

**The design of an experiment in which certain treatment arrangements are inadmissible.**

Biometrika 1954 : 41 : 287-95.

Consider an experiment in which the items are arranged in sets of  $k$  units. Suppose also that the  $k$  units in each set are arranged in order corresponding to the 1st, 2nd, etc. period of the set. Ordinarily the experiment would be arranged in a Latin Square or Youden Square, eliminating differences between sets and periods. If however the practical considerations impose a restriction on the order within sets then the Latin or Youden squares are not applicable. The author considers designs for this case assuming an additive model and minimizing the residual variance.

2558 ZIMMERMANN, K. F.

**Feldversuchswesen: die Gitterquadratmethode in praktischer Anwendung. (Field trial methods: the practical application of the lattice-square method).**

Züchter 1955 : 25 : 132-38.

The method of conducting trials using a lattice-square layout is described, and examples of its application for trials of forage crops at the Institut für Acker- und Pflanzenbau, Münchenberg, are given.

2559 HOBLYN, T. N., PEARCE, S. C. & FREEMAN, G. H.

**Some considerations in the design of successive experiments in fruit plantations.**

Biometrics 1954 : 10 : 503-15.

Part I of this paper investigates the problem of



successive experiments with the same fruit trees. It is not usually possible, on economic grounds, to replace a field of trees after an initial trial has been completed; designs are therefore considered which permit later experiments. Part II gives examples of these designs for two or more successive experiments.

2560 GURGEL, J. T. A.

Análise estatística da distribuição de Poisson. (**Statistical analysis of the Poisson distribution**).

An. Esc. Agric. Queiroz 1945 : 2 : Sep. No. 20 : 300-19.

Methods of testing biological data for conformity with a Poisson distribution are discussed with special reference to the statistical procedure used by Brieger *et al.* (cf. *PBA*,\* Vol. XIV, Abst. 937). Examples illustrating the analysis are given in connexion with the number of seeds per fruit in the Natal and Côco oranges and in the citrus variety Calamondin.

### † GENETICS

2561 SÁNCHEZ-MONGE, E.

Glosario de términos de genética y citogenética. Nuevos términos y usos. III. (**Glossary of genetical and cytogenetical terms. New terms and uses. III**).

An. Estac. exp. Aula Dei 1955 : 3 : 353-61.

Some further additions and revised definitions are presented (cf. *PBA*, Vol. XXII, Abst. 1570).

2562 TASCHDJIAN, E.

**Genetics, information and communication.**

Genetics 1954 : 39 : p. 997. (Abst.).

"This paper discusses the applicability of the concepts underlying information theory and communication theory to genetical problems, such as Mendelian heredity, linkage phenomena, mutations, degenerative inbreeding, excluding ontogenetic gene action. Quantitative measures for information and entropies are calculated for several typical cases and it is shown that by considering the genotype as a set of symbols and heredity as a communication between parents and offspring, genetics can be profitably and more intimately connected with other disciplines."

Huitième Congrès International de Botanique, Paris 1954. Rapports et communications parvenus avant le congrès aux sections 9 et 10. (**Eighth International Botanical Congress, Paris 1954. Reports and communications presented to the Congress in sections 9 and 10**).

1954 : Pp. 220.

Section 9 of this report of papers submitted to the above Congress deals with cytology and section 10 with genetics and experimental taxonomy.

2563 D'Amato, F. *Action des facteurs physiques et chimiques sur la mitose. (Action of physical and chemical agents on mitosis)*. (pp. 1-9).

The literature on the subject is reviewed, various types of mutagenic substances are listed and the problem of the origin of spontaneous mutations is discussed (cf. *PBA*, Vol. XXIV, Abst. 37).

2564 D'Amato, F. & Avanzi, S. *Nouvelles recherches sur l'action mutagène des acridines sur l'Allium cepa. (Further investigations on the mutagenic effect of acridines on A. cepa)*. (pp. 10-11).

In continuation of previous experiments (cf. *PBA*, Vol. XX, Abst. 2044, Vol. XXII, Abst. 51, Vol. XXIII, Absts. 23 and 1627 and Vol. XXIV, Abst. 75), the cytological effects of a further series of 7 acridine derivatives on the root-tip cells of *A. cepa* were studied. The results substantiated the hypothesis that there is a relationship between mutagenic and antibacterial activity (cf. *PBA*, Vol. XXIV, Abst. 75).

2565 Bhattacharjya, S. S. *Effects of X-rays on the heterochromatin in Impatiens*. (p. 12).

By X-irradiating pollen mother cells of three species of *Impatiens* differing in their chromatin contents it was shown that plants with a high proportion of heterochromatin are more sensitive to the effect of X rays than those with a low heterochromatin content and that heterochromatin is more sensitive than euchromatin. These experiments, which were carried out at the Institute of Botany, Cologne University, also indicated that most of the breakages occur in the intercalary heterochromatin.

\* *Plant Breeding Abstracts*.

† General studies, see also individual crops.



- 2566 Deysson, G. *Sur les divers types d'action antimitotique. (On the different kinds of antimitotic action).* (pp. 13-14).

The effects upon mitosis of a number of chemical substances, including antipyrine (cf. *PBA*, Vol. XXII, Absts. 2453 and 2454), maleic hydrazide (cf. *PBA*, Vol. XXIII, Abst. 74), barbital, chlorpromazine and several barbiturates are compared.

- 2567 Macfarlane, E. W. E. *Some phenyl mercurials as polyploidogenic and radiomimetic agents for plants, compared with colchicine, with remarks on antagonism.* (p. 14).

The organic mercurial compounds PMOH and PMN were found to possess thermodynamic properties similar to those of colchicine and to induce mitotic inhibition in root-tip cells of *Allium cepa*. They produced a higher frequency of radiomimetic effects than colchicine but proved less effective in inducing polyploidy.

- 2568 Östergren, G. *Astral rays in normal and chemically disturbed mitoses of higher plants.* (pp. 15-16).

Further experiments at the Institute of Genetics, Lund University, Sweden (cf. *PBA*, Vol. XXIV, Abst. 1606) on a wide range of plants, including *Vicia faba*, *Crepis capillaris*, *Secale cereale* and *Triticum vulgare* x *S. cereale*, suggested that the formation of astral rays during mitosis is common among all higher plants, maximum development being attained at the transition stage between anaphase and telophase. Before the chromosomes have reached the poles the astral rays are focused towards the spindle pole. After the chromosomes have reached the poles the astral rays are directed towards a point somewhere inside the chromosome group and from the telophase nuclei these fibril structures spread radially from the nuclear membrane. Treatment with aminopyrin serves merely to delay telophase, thus causing the chromosomes to remain longer in the anaphase condition.

- 2569 Riley, H. P. *The effect of oxygen and other chemicals on radiation damage to chromosomes.* (pp. 17-18).

The results of experiments at the University of Kentucky, in which microspores of *Tradescantia* sp. were X-irradiated in air, in pure oxygen and in the absence of oxygen are reported. Chromosome aberrations were least frequent when irradiation took place in pure oxygen and most frequent when the spores were irradiated in air (cf. *PBA*, Vol. XXIII, Absts. 859, 860 and 861). The effect of previously treating the *Tradescantia*

microspores with a series of chemical substances is also reported.

- 2570 Rollen, A. *Action de l'alcool octylique primaire (octanol) sur le noyau de l'Allium cepa. [Action of primary octylic alcohol (octanol) on the nucleus of A. cepa].* (pp. 19-21).

Weak solutions of octanol were found to have a mitodepressive and mitoclastic action on the nuclei of cells of *A. cepa* and produced a lethal effect in higher doses.

- 2571 Rosen, G. von. *Breaking of chromosomes by the action of elements of the periodical system and by some other principles.* (pp. 21-23).

The substance of this article has been summarized in *PBA*, Vol. XXIV, Abst. 1623.

- 2572 Scarascia, G.-T. *Action d'extraits de graines vieilles de Nicotiana tabacum L. sur la mitose. (The effect of extracts of old seeds of N. tabacum L. upon mitosis).* (pp. 23-26).

The substance of this article has been summarized in Abst. 40.

- 2573 Smith, H. H. *Comparative effects of certain chemicals on Tradescantia chromosomes as observed at pollen tube mitosis.* (p. 26).

See Abst. 61.

- 2574 Sparrow, A. H., Kojan, S. & Pond, V. *Growth of excised anthers from Trillium erectum in various sterile culture media.* (p. 27).

In experiments at the Biology Department of the Brookhaven National Laboratory, Upton, NY, to obtain a satisfactory medium for the sterile culture of excised anthers or isolated microspores, the addition of a 0.25 or 0.5 solution of coconut milk to the basic medium employed by J. H. Taylor (cf. *PBA*, Vol. XX, Abst. 1390) proved advantageous. The addition of yeast or casein was unsatisfactory, resulting in sterile anthers or disturbances at meiosis.

- 2575 Wada, B. *Chemical effects of troponoid compounds on the mitotic cell in vivo.* (pp. 27-29).

The effects of a number of troponoid compounds upon mitosis in the staminal hairs of *Tradescantia* sp. were studied. A relatively small number of the compounds and their derivatives produced mitotic aberrations. Those abnormal mitoses that were induced are discussed in the light of the author's theories on the molecular nature of the attractoplasm and chromonema



(cf. *PBA*, Vol. XXI, Abst. 2343 and Vol. XXIV, Abst. 2676).

2576 Waris, H. *Splitting of the nucleus by centrifugation.* (pp. 29–31).

Both uninucleate and binucleate cells of *Microsterias thomasi* and *M. rota* were obtained at the Institute of Botany of Helsinki University by centrifugation at metaphase. The uninucleate cells were not capable of reproduction but the binucleate cells gave rise to new forms with a changed genetic constitution.

2577 Wilson, G. B. & Bowen, C. C. *The study of mitotic poisons.* (pp. 31–34).

Two types of mitotic poisons are distinguished, viz. polyploidizing agents that exert their effect primarily at metaphase and so-called mitotic suppressors that delay or arrest development before or during prophase. The characteristic disruptions of the normal mitotic cycle brought about by these two kinds of antimitotic agencies are compared.

2578 Lima-de-Faria, A. *Pachytene analysis of a chromosome derivative of centromere size.* (p. 42).

During investigations of the progeny of plants of *Secale cereale* possessing B chromosomes (cf. *PBA*, Vol. XIX, Abst. 2534) at the Institute of Genetics, Lund University, Sweden, a plant containing a chromosome derivative of minute size was found. The fragment contained only 5–7 chromomere pairs and consisted of two sister chromatids at pachytene. Although the chromosome derivative possessed an incomplete centromere it proved capable of normal division and survived throughout the life of the plant, being found both in the root tips and in the pollen-mother cells.

2579 Ruch, F. *The coiling of meiotic chromosomes.* (p. 48).

The author reiterates his views (cf. *PBA*, Vol. XXI, Abst. 77) that there is no evidence to show that the chromosomes in *Tradescantia virginica* possess a double spiral structure. All his own experiments indicate the presence of coiled double threads with centromeres, but not of a minor coil running along a major coil.

2580. Vazart, B. *Comportement des éléments chromosomiques durant les phénomènes de la fécondation chez les angiospermes.* (Behaviour of chromosome elements during the phenomena of fertilization in angiosperms). (pp. 53–54).

A general account of the role played by chromosome elements during the fertilization process is presented.

2581 Löve, A. [A]. *The foundations of cytotaxonomy.* (pp. 59–66).

An historical survey of the science of cytotaxonomy is presented.

2582 Hamel, J. L. *Intérêt de l'étude des structures nucléaires en cyto-taxinomie.* (The usefulness of the study of nuclear structures in cytotaxonomy). (pp. 69–71).

The substance of this article has been summarized in Abst. 2364.

2583 Hara, H. *Morphological and chromosome variations in widespread eurasiatic species.* (pp. 71–72).

The problem of the evolution and classification of plant species common to both Japan and Europe but consisting of races with different morphological features and chromosome numbers is discussed.

2584 Jones, K. *A consideration of certain aspects of cytotaxonomic investigation in the light of results obtained in Holcus.* (pp. 75–77).

A report on recent work at the Welsh Plant Breeding Station, Aberystwyth, on the chromosome numbers of *H. mollis* and *H. lanatus* is presented, together with an account of hybrids obtained by crossing these two species (cf. *PBA*, Vol. XXIII, Abst. 2745).

2585 Tutin, T. G. *The relationships of Poa annua L.* (p. 88).

Hybrids were obtained at the University College of Leicester from crosses of *P. annua* with *P. infirma* and *P. supina*, the latter cross proving considerably more successful than the former. The  $F_1$  generations of both these crosses were triploid and completely sterile. At meiosis in the pollen mother cells 7 bivalents and 7 univalents were formed, pairing of the bivalents in each case being apparently complete. It is therefore suggested that *P. annua* is an allo-tetraploid, probably of fairly recent origin, derived from *P. infirma* and *P. supina*.

$F_1$  hybrids from *P. supina* x *P. infirma* proved highly sterile, but later generations have shown a considerable improvement in fertility.

2586 Wilkinson, J. *The cytotaxonomy of some Salix species.* (pp. 91–92).

New chromosome numbers recently reported for a number of species of the genus *Salix* are listed. Several species, e.g. *S. caprea* and *S. triandra*, appear to occur as both diploids and tetraploids without any corresponding taxonomic differences to distinguish the one from the other. Varying degrees of amphiplasty occur



in interspecific hybrids, depending on the extent to which the parental species are separated taxonomically. Thus, the hybrids *S. aurita* x *S. atrocinerea* and *S. lapponum* x *S. viminalis*, although exhibiting differential amphiplasty in the form of satellite suppression, display little neutral amphiplasty, whilst *S. caprea* x *S. viminalis* and *S. lapponum* x *S. aurita*, the parental species of which are more widely separated from the viewpoint of systematics, exhibit marked amphiplasty of both types. Instances of amphiplasty have also been observed in the genus *Quercus* in south-west England.

- 2587 Bajer, A. *The endosperm, a new material for experimental studies on mitosis in vivo with examples of its application and a motion picture demonstration.* (pp. 95-96).

It is suggested that the endosperm has advantages over other plant material for observations of mitosis *in vivo* and *in vitro*, the lack of cellulose walls facilitating micrurgical studies and studies in polarized light (cf. Abst. 58). Experiments with *Haemanthus* are described briefly.

- 2588 Hocquette, M. *Noyaux interphasiques et noyaux quiescents (types à euchromocentres). Acides désoxyribonucléiques et individualité des chromosomes. [Interphasic nuclei and resting nuclei (forms with euchromocentres). Deoxyribonucleic acids and the individuality of the chromosomes].* (pp. 106-07).

The chemical constitution of the nucleus and the relationship between the nucleus and chromocentre are considered. In both interphasic and resting nuclei, the amounts of deoxyribonucleic acid present remain constant and the view is expressed that the deoxyribonucleic acid and not the chromosomes constitute the stable element in resting nuclei.

- 2589 Hocquette, M. & Hocquette. *Rôle physiologique du nucléole dans un noyau quiescent. (Physiological role of the nucleolus in a resting nucleus).* (pp. 107-08).

The structure of the resting nuclei of the hypocotyl axis of *Cucurbita pepo* and *Phaseolus vulgaris* is described. The information given is substantially the same as that summarized in *PBA*, Vol. XVIII, Abst. 2056 and Vol. XXIII, Abst. 49.

- 2590 Politis, J. *Recherches cytologiques sur la formation des pigments anthocyaniques dans les fruits de la vigne. (Cytological investigations on the formation of anthocyanin pigments in the fruits of the vine).* (pp. 109-10).

The inheritance of anthocyanin pigmentation in grapes is discussed.

- 2591 Michaelis, P. *Methods and possibilities for the analysis of cytoplasmic inheritance.* (pp. 113-20).

A general review of work on the role of the cytoplasm in heredity is given, with particular reference to the plasmon, the mechanism by which cytoplasmic inheritance is controlled, and the relationship between gene action and cytoplasmic inheritance. Mention is made of crosses effected between different species of *Epilobium* with a view to studying the mode of plasmon segregation and the genetical basis of the inheritance of plastid characters (cf. Abst. 656).

- 2592 Lewis, D. *An unstable developmental plasmagene: the rogue tomato.* (pp. 121-22).

Reference should be made to *PBA*, Vol. XXIV, Abst. 2539.

- 2593 Papazian, H. P. *Sectoring in a homokaryotic mycelium of Schizophyllum.* (pp. 122-23).

The results of investigations at Yale University into the genetical basis of sectoring in a homokaryotic mycelium of *Schizophyllum* are presented.

- 2594 Lewis, D. *Incompatibility in relation to physiology genetics and evolutionary taxonomy.* (pp. 124-32).

The genetical and physiological basis of self sterility in both angiosperms and fungi is described, together with an account of the significance of self incompatibility in evolution and a note on the occurrence of mutations of the incompatibility gene, in particular in *Oenothera*, *Trifolium* and *Prunus*.

- 2595 Bateman, A. J. *The diversity of incompatibility systems in flowering plants.* (pp. 138-45).

Various incompatibility systems in flowering plants are discussed, a distinction being drawn between two basic methods of obviating self fertilization, viz. (1) the presence in the style of substances that promote the growth of foreign pollen but not of self pollen and (2) an oppositional mechanism that inhibits the growth of self



pollen. A distinction is also made between systems dependent upon only one, or at the most two, loci and those in which there appears to be an indefinite number of distinct alleles at one locus. It is suggested that the mechanism of incompatibility has probably arisen independently many times, possibly from a condition in which several loci produce antigens. Selection of nonspecific modifiers to increase the effectiveness of all loci, or of specific modifiers acting on one or two loci only, has the effect of gradually improving the efficiency of the polygenic system. Self sterility may also be caused by the later disintegration of an ovule fertilized by an incompatible pollen tube. Possible interactions between alleles determining sporophytic and gametophytic control of incompatibility are discussed.

- 2596 Linskens, H. F. *Biochemical studies on the incompatibility-reaction in the style of Petunia.* (pp. 146-47).

In the first 12 hours after pollination, styles of self-sterile *Petunia* clones pollinated with self pollen increased their oxygen intake and consumed the available sugar at a faster rate than when pollinated with foreign pollen. The hypothesis is put forward that the energy required for the incompatibility reaction may be derived from an increased rate of carbohydrate metabolism.

- 2597 Straub, J. *Die Physiologie der Selbststerilität. (The physiology of self sterility).* (pp. 148-51).

Recent work on the genetics of incompatibility and the chemical basis of the inhibition of the growth of pollen tubes in incompatible styles is reviewed.

- 2598 Whitehouse, H. L. K. *Incompatibility in fungi.* (pp. 152-60).

The author differentiates between three main types of self incompatibility in fungi, viz. (1) primary incompatibility, which is found in isogamous aquatic Phycomycetes and is thought to constitute the oldest form of self incompatibility, (2) secondary incompatibility, so designated because it is thought to have arisen after the evolution of differentiated sex organs, and found in the Ascomycetes, Uredinales and Ustilaginales, in which although male and female organs exist in one individual, fertilization can occur only between the male organs of one individual and the female organs of another, and (3) tertiary incompatibility determined by multiple alleles at either one or two loci. The last-named type of self incompatibility is unlikely to have evolved until secondary incompatibility

had become well established and sex organs subsequently lost. Experiments are being carried out at the Botany School, Cambridge University, to establish whether the multiple alleles in *Schizophyllum commune* are closely-linked multiple loci (cf. *PBA*, Vol. XXII, Abst. 1695).

- 2599 Papazian, H. P. *Problems of incompatibility in the fungi with special reference to Schizophyllum.* (pp. 161-62).

A brief account of current work at the Osborn Botanical Laboratory, Yale University, on incompatibility factors in *Schizophyllum commune* and *Coprinus oïdia* is presented (cf. *PBA*, Vol. XX, Abst. 1489, Vol. XXI, Abst. 1664 and Vol. XXII, Absts. 1695 and 1696).

- 2600 Crosby, J. L. *Populations and evolution: the significance of incompatibility.* (pp. 163-69).

The range of incompatibility systems in flowering plants is investigated and the literature on the subject submitted to a critical review. The author's own experiments on ecotypes of *Primula vulgaris* are also resumed briefly (cf. *PBA*, Vol. XIX, Abst. 62 and Vol. XX, Abst. 736), with particular reference to the effectiveness of self-sterility mechanisms in promoting outbreeding and their influence on the genetical structure of a given population.

- 2601 Valentine, D. H. *Seed-incompatibility.* (pp. 170-71).

The term seed incompatibility is proposed for cases in which, although pollen compatibility is complete, hybridization may fail because of the death of the young ovule after fertilization. The results of crosses effected at the University of Durham, England, between *Primula veris*, *P. elatior* and *P. vulgaris* indicate that seed incompatibility is genetically determined.

- 2602 Rollins, R. C. *Interspecific hybridization and its role in plant evolution.* (pp. 172-80).

The article deals with the importance of interspecific hybridization in providing a wide range of genetic material upon which natural selection can operate and thus give rise to new species. In central Tennessee, the author has observed numerous populations of *Lesquerella densipila* x *L. lescurei* hybrids which are apparently completely fertile and capable of survival without back-crossing to either parental species.

- 2603 Gilmour, J. S. L. and Heslop-Harrison, J. *Taxonomy and the units of microevolutionary change.* (p. 185).

See *PBA*, Vol. XXIV, Abst. 2623.



- 2604 Stebbins, G. L. (Jun.). *Reproductive isolation and the origin of species*. (pp. 185-86).

The writer discusses briefly the importance of sterility barriers in the evolution of species and suggests that natural selection and interspecific hybridization have played a major role in the origin of such barriers (cf. Abst. 1546). There are two principal ways in which natural selection can operate, firstly by the occurrence of mutations in the course of the adaptation of a population to a new environment and secondly through the building up of adaptive combinations of genes leading to populations differing from each other in respect of chromosomal rearrangements so that hybrids between them will have chromosomal sterility. Hybridization between species may also explain the occurrence of sterility barriers in that recombination of genes and chromosomal segments in the diploid progenies of interspecific hybrids can produce new entities reproductively isolated from both parental species and which, from the genetical aspect, can be regarded as new species.

- 2605 Dansereau, P. *Barrières écologiques entre les espèces sympatriques*. (Écological barriers between sympatric species). (p. 187).

The question of the occurrence of ecological barriers between sympatric species is discussed.

- 2606 Gustafsson, Å. [A]. *The species concept in apomictic groups*. (pp. 187-88).

A fuller article by the same author and on the same subject has been summarized in PBA, Vol. XX, Abst. 114.

- 2607 Matsumura, S. *Nullisomic dwarfs and their gigas-plants in the offspring of a pentaploid wheat hybrid*. (pp. 196-97).

A number of plants of normal height were found in the progeny of selfed nullisomic dwarf hybrids ( $2n = 40$ ) derived from crosses between *Triticum polonicum* and *T. spelta* (cf. PBA, Vol. XXIII, Abst. 1053). These so-called gigas strains possessed a chromosome complement of  $2n = 41$  or 42 and mainly bred true to type, very few dwarf plants with  $2n = 40$  being found in subsequent generations. Genome analyses of the progeny of 7 different gigas strains crossed with *T. polonicum*, *T. spelta* or *T. vulgare* suggested that the additional chromosomes were derived from the A or B genome.

- 2608 Simmonds, N. W. *The origin of the edible bananas*. (p. 198).

The genetical basis of edibility in the banana is mentioned and a distinction drawn between

the Fe'i bananas ( $2n = 20$ ) of the Pacific region and the bispecific hybrid *Musa balbisiana* x *M. acuminata* (cf. PBA, Vol. XVIII, Absts. 1857 and 1858) which has  $2n = 22$  and is assumed to have originated in the Burmo-Malayan area.

- 2609 Cauderon, Y. *Obtention d'amphidiploïdes à partir de croisements entre des Triticum à  $2n = 28$  et Agropyrum glaucum ( $2n = 42$ )*. [Amphidiploids obtained from crosses between *Triticum* species with  $2n = 28$  and *A. glaucum* ( $2n = 42$ )]. (pp. 199-200).

At the Central Station of Genetics and Plant Breeding, Versailles, fertile amphidiploids have been obtained by treating the  $F_1$  of *T. dicoccum* x *A. glaucum* and *T. timopheevi* x *A. glaucum* with a 0.05% colchicine solution.

- 2610 Izard, C. *Cytogénétique de types non tumoraux, obtenus par traitement aux rayons X, de l'amphidiploïde tumoral N. glauca Grah. x N. langsdorffii Weinn.* (Cytogenetics of nontumorous forms obtained by X-ray treatment of the tumorous amphidiploid *N. glauca* Grah. x *N. langsdorffii* Weinn.). (pp. 200-201).

See Abst. 2261.

- 2611 Hitier, H. & Izard, C. *Mutations expérimentales produites par l'essence de moutarde chez Nicotiana tabacum L.* (Experimental mutations produced by mustard oil in *N. tabacum* L.). (p. 201).

The results of experiments at the Bergerac Tobacco Research Institute are summarized (cf. PBA, Vol. XXIII, Abst. 1370).

- 2612 Bolsunov, I. *Le problème de la création de variétés de "Nicotiana" sans bourgeons axillaires et sa réalisation pratique*. (The problem of the production of varieties of *Nicotiana* without axillary buds and its practical application). (pp. 202-03).

See Abst. 1291.

- 2613 Galán, F. *Les gènes réalisateurs du sexe et leur mode d'action chez Ecballium elaterium*. (The genes determining sex and their mode of action in *E. elaterium*). (p. 204).

See PBA, Vol. XXIV, Abst. 837.

- 2614 Brabec, F. *Ueber die Natur der Winklerschen Burdonen und die Pfropfhybridfrage*. (On the nature of Winkler's burdos and the question of graft hybrids). (pp. 205-06).

See Abst. 1493.



- 2615 Peltier, M. A. G. *Sur la fécondité des hybrides de première génération chez le riz cultivé* (*Oryza sativa* L.). [On the fertility of first-generation hybrids in cultivated rice (*O. sativa* L.)]. (pp. 206-07).

Crosses effected in Madagascar between different tropical varieties resulted, in many cases, in as great a degree of reduced fertility in the  $F_1$  hybrids as was found in crosses between tropical varieties and varieties from the temperate zone. It is therefore concluded that reduced fertility in hybrids of tropical varieties with varieties from the temperate zone is not attributable to the fact that the parental varieties were derived from different ecological regions.

- 2616 Satina, S. & Blakeslee, A. F. *Differences in embryonic development in selfs and incompatible crosses of 10 species of Datura*. (pp. 208-09).

Seed development in selfs and crosses of 10 species of *Datura* is compared, special attention being paid to embryo differentiation and endosperm growth and to the endothelium and other tissues constituting the testa. Species, when selfed, differed in the speed of differentiation of the embryo, in the size and number of the cells forming the suspensor, in the time necessary for the formation of oil and aleurone in embryo and endosperm but not in the rate of growth of the testa. In some crosses between incompatible species, fertilization took place but the endosperm later disintegrated; the stage at which this disintegration occurred was largely dependent upon the species employed as parents.

- 2617 Rietsema, J., Blondel, B. & Blakeslee, A. F. *Chemical changes in embryonic development of Datura stramonium and the incompatible cross Datura innoxia x D. discolor*. (pp. 209-10).

The results of the experiments described in this article are similar to those summarized in *PBA*, Vol. XXIII, Abst. 816.

- 2618 Hrubý, K. *Growing of interspecific Prunus hybrids from excised embryos*. (pp. 210-11).

At the Genetics Institute of the Charles University, Prague, hybrids between the sweet and sour cherry were successfully obtained from excised embryos.

- 2619 Malinowski, E. *Heterosis in Phaseolus and Petunia*. (pp. 211-13).

This article is a summary of work already reported in *PBA*, Vol. XX, Abst. 2032 and Vol. XXIII, Abst. 815.

- 2620 Carles, J. *L'hétérosis et sa signification*. (*Heterosis and its importance*). (pp. 213-14).

Reference is made to differences in chemical content between different maize hybrids (cf. *PBA*, Vol. XXIII, Abst. 310).

- 2621 Sermoniti, G. & Caglioti, M. T. *Genetic research on the production of penicillin in Penicillium chrysogenum*. (p. 215).

Mutant strains, designated *sp* and lacking the ability to produce penicillin, were obtained by ultraviolet irradiation of *P. chrysogenum*. Genetical analysis of two heterocaryons and two heterozygous diploids subsequently obtained by synthesis between two of the mutant strains and a penicillin-producing strain indicated that ability to produce penicillin is dominant to the suppression of this ability. As the recessive genes suppressing production of penicillin behave as alleles of the same series and are located at the same locus, the ability to produce penicillin is not restored even by intranuclear association of the genotypes of mutant strains.

- 2622 Maurizio, A. *Sécrétion de nectar des plantes polyploïdes*. (*Nectar secretion in polyploid plants*). (p. 216).

A comparison of the amount of nectar secreted by polyploid plants and diploids of the same species indicated that polyploids produce 1.5-4 times as much nectar as diploids but that sugar content is lower in the polyploids.

- 2623 ANDERSON, V. L. & KEMPTHORNE, O. **A model for the study of quantitative inheritance.** Genetics 1954 : 39 : 883-98.

A factorial gene model for studying quantitative inheritance is presented.

The model is given by the equation  $a_1b_1c_k \dots = \mu + A_1 + B_1 + A_1B_1 + C_k + A_1C_k + B_1C_k + A_1B_1C_k + \dots$  where  $a_1b_1c_k \dots$  represents the genotypic value of a character determined by  $a, b, c \dots$  loci, the subscripts denoting the phase (0, 1 or 2 dominant alleles).  $\mu$  is the mean genotypic value;  $A_1, B_1, C_k \dots$  represent the effects of loci;  $A_1B_1, A_1C_k, B_1C_k, A_1B_1C_k \dots$  represent epistatic effects. Linkage, lethality and unequal viability of genotypes are ignored. The model was applied to some unpublished data on selfing in red pepper obtained by Kjamnanonda and to some unpublished data on crossed and selfed progenies derived from hybrids between inbred lines of maize obtained by Stringfield. In both cases epistatic components were found to constitute an important part of the genotypic values.



## 2624 JINKS, J. L.

**The analysis of continuous variation in a diallel cross of *Nicotiana rustica* varieties.**

Genetics 1954 : 39 : 767-88.

The method of analysing quantitative variation introduced by Mather (cf. *PBA*, Vol. XIX, p. 913) is extended here to the analysis of diallel crosses involving 8 inbred lines of *Nicotiana rustica*.

The regression of array covariance on array variance in respect of flowering time had a slope of 1 as would be expected if the genes concerned acted independently. The regressions for the other characters studied all deviated from this slope and hence it is inferred that gene interaction was operative. It is shown that gene interaction was responsible for the observed heterosis in height and leaf length.

The estimated number of effective factors distinguishing the inbreds never exceeded 2, which seems to imply that the assumptions involved in this application of the analysis are at fault.

## 2625 HAYMAN, B. I.

**The theory and analysis of diallel crosses.**

Genetics 1954 : 39 : 789-809.

An algebraic analysis of diallel crossing is presented, assuming (1) diploid segregation, (2) no difference between reciprocals, (3) independent action of nonalleles, (4) no multiple allelism, (5) homozygous parents and (6) genes distributed independently between the parents. From the statistics obtained from measurements of the progeny, estimates can be made of the overall and relative parental dominance and of the degree of symmetry of the gene distribution among the lines. An example is worked out utilizing data from a diallel cross involving 8 inbreds of *Nicotiana rustica* made by Jinks (cf. Abst. 2624).

## 2626 COCKERHAM, C. C.

**An extension of the concept of partitioning hereditary variance for analysis of covariances among relatives when epistasis is present.**

Genetics 1954 : 39 : 859-82.

A mathematical study of the partitioning of hereditary variance into additive ( $a$ ), dominance ( $d$ ) and epistatic components is presented. In the case of  $n$  loci, there are  $3^n - 1$  components, of which  $n$  are additive types,  $n$  are dominance types and the remainder epistatic types. Among the last, there are  $2n(n-1)$  2-factor

components in the ratio  $1(a \times a) : 2(d \times d)$ ;

similarly, there are  $\frac{4}{3}n(n-1)(n-2)$  3-factor components in the ratio  $1(a \times a \times a) : 3(a \times a \times d) : 3(a \times d \times d) : 1(d \times d \times d)$ ; and so on.

Correlations between the hereditary deviations of relatives (parent-offspring, full sib) are worked out for randomly mating populations, self-fertilizing populations and populations derived from randomly-mated inbred parents.

## 2627 LINDEGREN, C. C. &amp; SHULT, E. E.

**A general theory of crossing-over.**

Genetics 1954 : 39 : p. 980. (Abst.).

A theory of crossing-over is formulated without making the incorrect assumption that low frequency of recombination implies low frequency of crossing-over. Tetrad analysis is based on the frequencies of parental types, recombinant type and tetratype tetrads; information is not given on the organism investigated. The possible effects of sister-strand exchange and chromatid interference upon the frequencies of different types of tetrads were analysed by considering the effect of a single cross-over inserted to the right of a postulated cross-over pattern and calculating the limits of continued insertion of such cross-overs. It has been shown that sister-strand crossing-over either does not occur or occurs with a very low frequency and that chromatid and chromosomal interference generally have low values. The relatively high frequency of recombinant tetrads indicated that crossing-over at the two-strand stage is not uncommon. The exceptionally high frequency of recombinant tetrads in some dihybrid analyses could only be explained on the assumption that crossing-over at the two-strand stage occurred at every meiosis in one short region of the chromosome; it is concluded that the order of members of a linkage group is determined by minimizing the frequency of random recombination between the loci involved. A new theory of crossing-over is proposed in which it is postulated that crossing-over occurs at both the two-strand and four-strand stages.

## 2628 BENNETT, J. H.

**The distribution of heterogeneity upon inbreeding.**

J.R. statist. Soc. 1954 : Ser. B. : 16 : 88-99.

The variance of the length of heterogeneous chromosome tracts after a given number of generations of inbreeding is calculated by matrix methods. The breeding systems discussed are



selfing, sib mating and parent-offspring mating in disomic organisms and selfing in tetrasomic organisms. The frequency distribution of the length of the heterogeneous tracts is expressed in terms of the modified Bessel function of the first kind, the probability of complete homogeneity being represented by a condensation at  $x = 0$ .

For a given generation, there exists a critical map length  $c$  such that for any  $x < c$ , the probability of the length of the heterogeneous tracts being less than  $x$  is greater for parent-offspring mating than for sib mating, and conversely, for any  $x > c$ , the corresponding probability is less for parent-offspring mating than for sib mating. The results of this approach are examined in the light of the theory of junctions used by the author in an earlier paper (cf. *PBA*, Vol. XXIV, Abst. 777).

2629 HALDANE, J. B. S.

**The complete matrices for brother-sister and alternate parent-offspring mating involving one locus.**

J. Genet. 1955 : 53 : 315-24.

Using matrix algebra, latent roots are obtained for populations in which (1) brother-sister mating or (2) parent-offspring mating is operative. One locus is considered and no restriction is made as to the frequencies of the different alleles. Expressions are also derived for the degree of heterozygosity and impurity after  $n$  generations (cf. *PBA*, Vol. VIII, Abst. 7).

2630 PIZA, S. DE T. (JUN.).

**A agonia do gen. (The agony of the gene).**

An. Esc. Agric. Queiroz 1951 : 8 : 433-636.

The author examines, with copious citations, the ideas of Buffon, Béchamp, Spencer, Darwin, Nägeli, de Vries, Weismann, Mendel and the early protagonists of the gene theory, showing the concept of a corpuscular gene to be purely hypothetical; autosynthesis is a property of the chromosome and hence, by extension, of the gene, not *vice versa*. Cytological data are referred to which do not accord with the view that the discs in giant chromosomes in the Diptera correspond to individual genes or groups of genes and they are regarded as regions of special functional activity along the chromosome. Various authorities are cited showing how their attempts to redefine the gene as a section of the chromosome lead them not only to contradict one another but to negate the original conception of a gene as a particulate body. To assume that there are 75 genes for

bristle length because 75 different deletions are known to affect it is considered naive and the system envisaged by the author is one in which both chromosomes and cytoplasm, acting together, are required for the development of any character; a slight alteration in one of the components of either may lead to a new equilibrium in the system, thus leading to a hereditary change, just as in an atomic system. Examination of the literature on induced mutation leads to the conclusion that so-called gene mutations are in fact due to small structural changes in the chromosome; other evidence is assembled to show that heterochromatin is not genetically inert, and the distinctions between euchromatin and heterochromatin and major genes and polygenes are considered arbitrary and artificial. The chromatin, and any differences it may display, are thought to be the result, rather than the cause, of the hereditary constitution of the individual chromosomes. Sexuality, the podoptera effect in *Drosophila* and other phenomena are used to illustrate the functioning of the chromosome as a whole, or the entire cell, in heredity. It is pointed out that experimental data now indicate that enzymes are formed in the cytoplasm by a complex series of reactions and that this militates against the principle of a direct relationship between gene and enzyme as visualized in the one gene : one enzyme hypothesis. Adaptation of enzyme systems to substrate, gene conversion and transduction are called upon in support of the author's view and linkage and crossing-over percentages are regarded as mean expressions of statistical probabilities, being no direct proof of linear arrangement upon a chromosome. The dissertation ends with a demonstration that genes are no different in essentials from the pangenes and other corpuscles assumed by early writers and now discarded. The view that the chromosome is the true unit of hereditary transmission is reaffirmed.

**Symposium on pseudoallelism and the theory of the gene, Genetics Society of America.**

Amer. Nat. 1955 : 89 : 65-122.

2631 Green, M. M. *Pseudoallelism and the gene concept.* (pp. 65-71).

Surveying investigations on pseudoallelism, chiefly in *Drosophila*, the author argues that this phenomenon supports the concept of the gene as a spatial, mutational and functional unit. Functional dissimilarity is the rule among members of a pseudoallelic complex.

Mutations occurring as members of a pseudo-



allelic system in one species may occur as independent linked mutations in another.

2632 Lewis, E. B. *Some aspects of position of pseudoallelism.* (pp. 73-89).

On the basis of investigations on *Drosophila*, the following interpretation of pseudoallelism is proposed: (1) the normal allele of one of the pseudoallelic genes controls reaction  $S \rightarrow A$ , and the normal allele of a second gene of the series reaction  $A \rightarrow B$ ; (2) mutant alleles block or impair these reactions; and (3) substance A, at least, is produced at or very close to the site of the gene and is transported along the chromosome more readily than to the homologous chromosome. The cis-arrangement of wild-type alleles ( $a^+b^+/ab$ ) would therefore result in a more typical production of B than the trans-arrangement  $a^+b/ab^+$ . The phenotypic differences between coupling and repulsion genotypes may thus be explained. Further support for this model has been provided by the discovery that heterozygosity for certain chromosomal arrangements may alter the phenotypes of particular trans-types towards a more extreme departure from the wild type but does not in general alter the phenotype of cis-types; this new type of position effect is termed transvection (cf. Abst. 2686).

2633 Laughman, J. R. *Structural and functional bases for the action of the A alleles in maize.* (pp. 91-103).

Evidence has been obtained suggesting that the  $A^b$  "allele" affecting anthocyanin production consists of two separable and adjacent members of a serial duplication, the components of which have retained synaptic equivalence. Structural and functional variability was found among the  $A^b$  complexes of different geographical origin.

2634 Stephens, S. G. *Summary, synthesis and critique.* (pp. 117-22).

It is pointed out that the more rigidly the particulate concept of the gene is applied in interpreting pseudoallelic effects the less important become the properties of the gene *per se* and the more important its spatial relationships. It is suggested that the sequential gene-substrate system proposed by Lewis may not be generally applicable as an explanation of pseudoallelic behaviour. An interpretation of pseudoallelism in terms of isomerism merits consideration. In discussing the significance of gene duplication in relation to the general properties of organic chemical chains, it is suggested that in *Gossypium* originally duplicate loci have

changed in function, each amphidiploid species tending to become functionally diploid.

2635 DEMEREC, M.

**What is a gene?—Twenty years later.**

Amer. Nat. 1955 : 89 : 5-20.

The author first surveys the results of his investigations on induced mutability in *Escherichia coli* and then continues with an account of experiments on the mutant alleles controlling streptomycin reaction in *E. coli* and on pseudoallelism in *Salmonella typhimurium*. Most of the work referred to has been previously reported (Abst. 1600); some hitherto unpublished data are however given on transduction experiments on *S. typhimurium* which have demonstrated the existence of two or more alleles at 15 loci and provided support for the hypothesis that crossing-over between a chromosome of the recipient bacterium and a segment of a chromosome brought by the phage from a donor bacterium is responsible for transduction. In the author's view, gene mutations occur during gene reproduction and agents increasing mutability, such as radiations, chemicals, mutator genes and specific chromosomal arrangements, do so by creating cellular conditions which lead to an increase in the frequency of failure of genes to reproduce as exact replicas of themselves.

2636 HARTE, C.

**Die Wirkung der Gene auf biochemische Vorgänge bei höheren Pflanzen. (The effect of genes on biochemical processes in higher plants).**

Naturwissenschaften 1955 : 42 : 199-206.

The mode of inheritance of morphological and physiological characters in plants is outlined, pigment formation in the petals of carnation and cotton flowers being the principal example chosen to illustrate the writer's points. After various theories on the chemical nature and role of the gene have been discussed it is concluded that the opponents of the gene theory are correct in rejecting the idea of the gene as a separate entity.

2637 STRAUSS, B. S.

**A mechanism of gene interaction.**

Amer. Nat. 1955 : 89 : 141-50.

"The properties of multi-enzyme systems are discussed and a mechanism of coupling such systems by means of mutual inhibition is suggested. Coupling by inhibition is a characteristic of varied types of biological phenomena. Genes control the component step reactions of multi-enzyme systems. Gene interaction is the



result of the interaction of the multi-enzyme systems controlled by genes rather than by interaction of the genes themselves."

[Author's summary].

- 2638 MICHAELIS, P.  
Wege und Möglichkeiten zur Analyse des plasmatischen Erbgutes. (**Means and possibilities of analysing plasmic inheritance**).  
Biol. Zbl. 1954 : 73 : 353-99.

The author puts forward a theory of inheritance in which he postulates a single genetic system composed of closely interacting nuclear genes and mutable cytoplasmic elements. The results of crosses between different mutant lines of *Epilobium* spp. are used to illustrate the mechanism of cytoplasmic inheritance and mention is made of mutations of the plasmon induced experimentally at the Max Planck Institute, Voldagsen, Germany (cf. *PBA*, Vol. XXIV, Abst. 1563).

## VARIATIONS, MODIFICATIONS, MUTATIONS

- 2639 KEMPTHORNE, O.  
**The theoretical values of correlations between relatives in random mating populations.**  
Genetics 1955 : 40 : 153-67.

The partitioning of genetic variance into its additive, dominance and epistatic components is discussed for the case of a population with a zero probability of inbreeding. A method of deriving the covariances between any pair of relatives for any character is then explained and illustrated by means of a fictitious example.

- 2640 BRIEGER, F. G.  
Contribuições à teoria da genética em populações. (**Contributions to the theory of population genetics**).  
An. Esc. Agric. Queiroz 1948 : 5 : 65-160.

A general survey of the distribution of gene frequencies in cross-fertilized, self-fertilized and intermediate populations under various selective conditions is presented. The relevant formulae are simplified by the use of survival indices for the homozygotes expressed as ratios to the survival values of the heterozygotes.

The mathematical relationships are further discussed with reference to (1) the rate at which homozygosis is approached under various mating systems, (2) heterosis, (3) the distribution of

recessive lethals in unselected populations and (4) incompatible genes.

- 2641 BRIEGER, F. G.  
**Population genetics and evolutionary gene reserve in panmictic and selfed populations.**  
An. Esc. Agric. Queiroz 1952 : Anex. VIII : Bol. 10 : 47-103.

A mathematical study of alleles present in low frequencies (the evolutionary reserve) in self-fertilized, cross-fertilized and intermediate populations is presented. It is shown that, in populations in which genes are present both for self fertilization and for cross fertilization, the former should predominate unless prevented by a system of special survival indices. Separate discussion is given to the effects of differential survival indices for subviable, neutral, super-viable, heterotic and isolating mutant genes. Under conditions of random mating, subviable recessives, neutral and heterotic genes may accumulate in the genetic reserve; in selfed populations, isolating genes may also accumulate in some cases.

The efficiency of random mating *vs.* selfing under changing environmental conditions depends on the type of reserve genes being mobilized. Recessive subviables and neutral genes are more readily mobilized in selfed populations; heterotic genes are more readily mobilized in cross-fertilized organisms.

- 2642 SAKAI, K.  
**(Theoretical studies on the technique of plant breeding. I. Changes in heritability in various kinds of progenies of autogamous plants).**  
Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 145-48. [Japanese].

Formulae are derived for the variance of a given character, for the heritability in the  $F_n$  generation, and for the effect of antecedent selection on the  $F_n$  generation of hybrid bulk populations. It is concluded that the method of individual selection in the  $F_2$  and subsequent generations is inadvisable when breeding for yield. The author recommends bulk breeding till about the  $F_6$  and then progeny selection.

- 2643 HUXLEY, J.  
**Morphism and evolution.**  
Heredity 1955 : 9 : 1-52.

Basing his survey on the Bateson Lecture he delivered at the John Innes Horticultural Institution in July 1953, the author gives a comprehensive discussion of the significance of



balanced genetic polymorphism as a mode of intraspecific differentiation in animals and plants.

2644 KEMPTHORNE, O.

**The correlation between relatives in a simple autotetraploid population.**

Genetics 1955 : 40 : 168-74.

The covariance in respect of a single locus between relatives in a randomly-mating autotetraploid population is given by the formula  $(\Phi + \Phi')\frac{1}{4}\sigma_A^2 + [\Phi\Phi' + \Psi + \Psi']\frac{1}{8}\sigma_D^2 + (\Phi\Psi' + \Phi'\Psi)\frac{1}{4}\sigma_T^2 + \Psi\Psi'\sigma_F^2$ , where  $\Phi$  represents the probability of an allele being inherited by both relatives from the paternal side,  $\Phi'$  the corresponding probability on the maternal side,  $\Psi$  the probability of any pair of alleles being inherited by both relatives on the paternal side, and  $\Psi'$  the corresponding value for the female side.

2645 SCHWANITZ, F. & SCHWANITZ, H.

Eine Grossmutation bei *Linaria maroccana* L. : mut. *gratioloides*. (Mut. *gratioloides*, a macromutation of *L. maroccana* L.).

Beitr. Biol. Pfl. 1955 : 31 : 473-97.

The expression of floral abnormalities in the above mutant, under investigation at the Max Planck Institute for Breeding Research, Niedermarsberg, Westphalia, is strongly affected by environmental conditions, cultivation on highly fertile soils frequently resulting in the production of normal flowers. The mutant gene, designated *grat*, brings about a reduction in the ability of the plant to produce those enzymes essential for the normal development of the spur and corolla mouth. It is suggested that the wide diversity in floral forms that is found within many genera and species may be due, in the first instance, to the mutation of a single gene, this mutation expressing itself in varying degrees under different environmental conditions and giving rise ultimately to a wide range of new forms.

2646 ZAMENHOF, S., LEIDY, F. & HAHN, E.

**Unstability of transforming principle induced by mutagenic agents.**

Genetics 1954 : 39 : 1002-03. (Abst.).

The transforming principle (DNA) of *Hemophilus influenzae* was destabilized as the result of treatment with heat for one hour, nitrogen mustard, deoxyribonuclease and a sublethal dosage of ultraviolet irradiation or as the result of pH change. The destabilization of determinants of heredity, in the form of the transform-

ing principle, by mutagenic agents *in vitro* may have a bearing on the frequently inferred destabilization of genes prior to actual mutation and on the delayed effect of mutagens. The destabilization obtained *in vitro* was not retained upon reproduction in transformed cells and was therefore not a mutation occurring *in vitro*. As destabilization probably involves random breaking of hydrogen bonds in the DNA molecule, such random breaking does not appear to be a basis of mutation.

2647 (Studies on artificially induced mutation in Sweden).

Ikushugaku Zasshi/Jap. J. Breeding 1955 : 4 : p. 224. [Japanese].

A short synopsis of recent Swedish work on the production of economically valuable artificially-induced mutants of crop plants is given.

2648 KÁROLY, U.

Mit jelent számunkra a szovjet agrobiológia? (What Soviet agrobiolgy means to us).

Agrártudomány 1953 : 5 : 294-99.

The aim of Soviet agrobiolgy is described as the increase of the yield per plant in the interest of the working population. Great importance is attached to ascertaining the optimum environmental conditions for the maintenance of new varieties. It is stated that Bánkút wheat has been deteriorating for some years and that means must be found whereby it can be regenerated.

2649 MACUURA [MATSUURA], H.

(Mičurin's ideas in Japan).

Priroda (Nature), Leningrad 1955 : No. 5 : 45-47. [Russian].

This brief account of the beginnings of a Mičurin movement in Japan mentions personalities involved and papers dealing with Mičurin and Soviet genetics that have been published in Japan.

2650 KEULS, M. & SIEBEN, J. W.

**Two statistical problems in plant selection.**

Euphytica, Wageningen 1955 : 4 : 34-44.

It is shown how estimates of the standard deviations of the observed, genetical and environmental values of a plant can be made from analysis of variance of field trials. The authors then discuss (1) the relationship between intensity of genetic advance and method of selection and (2) how to minimize the chance of rejecting valuable breeding lines.



## EVOLUTION

- 2651 Huitième Congrès International de Botanique, Paris 1954. Rapports et communications parvenus avant le congrès à la section 17. (**Eighth International Botanical Congress, Paris 1954. Reports and communications presented to the Congress in section 17.**) Pp. 192.

Section 17 of the above report is concerned, *inter alia*, with evolutionary trends among the algae in relation to the origin of higher plants.

- 2652 DÄNIKER, A. U.  
Evolution und Epharmose. (**Evolution and epharmosis**).  
Verh. schweiz. naturf. Ges. 1954 : 134 : 56-75.

The history of systematic botany since Cesalpino is reviewed and the phylogenetic merits of various systems of plant classification are critically assessed. Adaptation to environmental changes by means of mutation and selection is discussed with special reference to the phylogeny and morphogenesis of the higher plants.

- 2653 VIRVILLE, A. D. DE  
La notion d'espèce et d'évolution. (**The concept of species and of evolution**). Histoire de la botanique en France. (**History of botany in France**).  
VIII Internat. Bot. Congr., Paris-Nice 1954 : 313-29.

An historical account is presented of the work of Lamarck, Bonnier, Naudin, Constantin, Jordan, Bernard and other French pioneers in the field of evolutionary science.

- 2654 SUKAČEV, V. N. [Editor]  
(**A survey of articles and letters received by the editor of the "Botaničeskii Žurnal" in connexion with the discussion on the problem of the species and of the origin of species**).  
Bot. Ž. (Bot. J.), Moskva 1955 : 40 : 217-26. [Russian].

A final analysis of unpublished contributions relating to the discussion on evolutionary problems conducted by the *Botaničeskii Žurnal* is given; as in the previous survey (cf. Abst. 41), the conclusion arrived at is that the majority of the contributors disagree with Lysenko's version of Darwinism. However, Arsenov accepts Lysenko's theories without reservation, while Conev, in Bulgaria, and Gluzdakov support the thesis that no intraspecific competition occurs under natural conditions. Gluzdakov also

rejects interspecific competition. Gordienko upholds Lysenko's view that qualitative changes may result in evolutionary leaps.

- 2655 ARSENOV, V. G.  
(**Has the discussion in the pages of the "Botaničeskii Žurnal" contributed anything of practical value to the teaching of biology and Darwinian principles in secondary and higher technical schools?**).  
Agrobiologija (Agrobiology) 1955 : No. 2 : 149-53.

Lysenko's concept of the species and of evolution are upheld against the arguments of his critics (cf. Absts. 43 and 44). The claim of the latter that natural selection forms the basis of evolutionary theory is rejected. It is stated that no new facts have emerged from the discussion to prove that intraspecific competition occurs.

- 2656 SUKAČEV, V. N. [Editor]  
(**Creative discussion of the problem of the species and of the origin of species should be broadened and deepened**).  
Bot. Ž. (Bot. J.), Moskva 1955 : 40 : 206-16. [Russian].

Recent papers relevant to the controversy are briefly analysed along the lines of the previous survey (cf. Abst. 44). Lysenko's concepts of the species and of evolution are rejected. It is stated that the results of German experiments (cf. Abst. 1491) conflict with Lysenko's dicta on vegetative hybridization and that Skripčinskii's critical analysis of experiments on interspecific conversion in cereals raises anew the problem of whether directed changes occur (cf. Abst. 2899). The resumption of polyploidy studies, advocated by Baranov (cf. *PBA*, Vol. XXIV, Abst. 2627), is mentioned with approval.

- 2657 SCHOPFER, W. H., MATTHEY, R., PEYER, B. & PORTMANN, A.  
Tatsachen und Theorien in der Frage der Evolution. (**Facts and theories in the question of evolution**).  
Verh. schweiz. naturf. Ges. 1954 : 134 : 88-94.

The contents of a symposium held at Altdorf, Switzerland, on 25 September 1954 are presented. W. Schopfer opened the discussion with an historical exposition of evolutionary theories current in the 18th and 19th centuries. R. Matthey followed with a lecture on the basic tenets of neo-Darwinism, but drew attention to the difficulty of explaining all evolutionary processes by the theory of mutation followed by



selection. The development of strains of bacteria resistant to certain toxic substances and of house flies resistant to DDT was cited as possibly exemplifying the inheritance of acquired characters. B. Peyer discussed the contribution made by paleontological studies to our knowledge of the course of evolution. He stressed, however, that little is known about evolution in pre-Cambrian times. The concept of the inheritance of acquired characters should not be dismissed in a dogmatic manner as isolated instances may have occurred and are not in conflict with the basic tenets of orthodox genetics. A. Portmann stressed the subjective element of "cultural compulsion" in the individual's approach to questions of evolution. He also deplored the attempt to find an all-embracing theory that would explain every aspect of evolution and suggested that a "comprehensive plurality" should replace a "deceptive monism" and that the quest for a vital force be abandoned. To this end research on the role played by mutations in the evolutionary process should be considered independently of morphological and paleontological studies.

2658 ŽUKOV-VEREŽNIKOV, N. N., MAISKII, I. N. & KALINIČENKO, L. A.

**(Further remarks on the problem of the species and of the origin of species in microbiology).**

Uspehi Sovrem. Biol. (Advanc. in Mod. Biol.) 1955 : 39 : 245-52. [Russian].

It is stated that Lysenko's evolutionary theories (cf. *PBA*, Vol. XXI, Abst. 2500) are supported by the results of Soviet microbiological research, notably the evidence of interspecific changes in some bacteria. In this connexion changes of *Bacterium pestis* into *B. pseudotuberculosis* and *B. coli* into *B. faecalis* f. *alkaligenes* are mentioned. In the first instance the change occurred in response to the action of a bacteriophage and in the other case it was obtained by vegetative hybridization. Lepešinskaja's theory of formation of cells *de novo* from non-cellular living substance (cf. *PBA*, Vol. XXI, Abst. 1509), which is stated to be implicit in Lysenko's concept of evolution, is also accepted.

2659 MATHER, K.

**Polymorphism as an outcome of disruptive selection.**

Evolution, NY 1955 : 9 : 52-61.

Three types of selection, viz. stabilizing, directional and disruptive, are distinguished: the last type arises when several optima are

favoured. With reference chiefly to animals but also to some examples among plants, the author analyses the situations which would favour the development of polymorphism as the result of this kind of selection. In discussing polymorphism in relation to speciation, he suggests that an autogamous group of species with a common chromosome number, as in wheat or oats, is in fact the representative of an ancient polymorphism which lost its essential unity when outbreeding was finally replaced by inbreeding, the major genes or supergenes distinguishing the so-called species being the relic of the former switching system.

## \*CYTOLOGY

2660 McLEISH, J.

**Chromosomes.**

J. Quekett micr. Cl. 1955 : 4 : 125-46.

A description of the processes of mitosis, meiosis and fertilization is followed by a short discussion on the influence of the nucleus on cell differentiation and an elementary account of simple Mendelian inheritance, the chemical composition of chromosomes and the effects on the organism of changes in chromosome structure or number.

2661 ŽINKIN, L. N. & MIHAĬLOV, V. P.

**("The new cell theory" and its factual basis).**

Uspehi Sovrem. Biol. (Advanc. in Mod. Biol.) 1955 : 39 : 228-44. [Russian].

This survey of research by Lepešinskaja (cf. *PBA*, Vol. XXI, Abst. 1509) and her disciples on formation of animal cells *de novo* from living substance reaches the conclusion that the new theory is unsubstantiated. Its dissemination at schools and universities and suppression of scientific arguments against it are criticized.

2662 SIRKS, M. J.

Chromosomenonderzoek vóór 1935.

**(Chromosome research before 1935).**

Vakbl. Biol. 1955 : 35 : 86-97.

A short historical survey of research prior to 1935 on the structure and nature of the chromosome is presented.

2663 BAJER, A.

Obserwacje nad strukturą wrzeciona i nie zanikającymi jąderkami. (**Observations on the structure of the spindle and on persisting nucleoli**).

Acta Soc. Bot. Polon. 1953 : 22 : 653-66.

The main aims of this study were to investigate

\* General studies, see also individual crops.



(1) spindle structure in metakinesis and changes in it in metaphase and (2) the mechanism of the elimination of the nucleoli. The material with persisting nucleoli which was used consisted of *Lupinus luteus*, *Canna indica*, *Ricinus communis*, *Cucumis sativus* and *Zea mays*.

The highest percentage (about 70%) of nucleoli persisting till telophase was found in *Lupinus*, the proportion in *Canna* being about 45%; the other material showed only few persisting nucleoli and these usually persisted only till metaphase.

Observations using the phase contrast method and the polarizing microscope seem to indicate that (1) there is a change in the submicroscopic structure of the spindle between metakinesis and the end of metaphase and (2) elimination of the nucleoli is caused, not by currents within the spindle, but by the extrusive action of the spindle fibres.

2664 TANDLER, C. J.

**The reaction of nucleoli with ammoniacal silver nitrate in darkness; additional data.**

J. Histochem. Cytochem. 1955 : 3 : 196-202.

By pretreating root-tip sections of *Allium cepa* with various chemical agents before treatment with ammoniacal  $\text{AgNO}_3$ , evidence was obtained indicating that reduction of this compound by the nucleoli is attributable to the presence of some specific substance in the nucleolus (cf. *PBA*, Vol. XXIV, Abst. 2645). A method of obtaining the maximum differentiation of nucleoli is described; it involves the treatment of frozen sections with mercuric acetate to eliminate nonspecific staining as the result of immersion in ammoniacal  $\text{AgNO}_3$  for 12-24 hours in darkness at 37-45%.

2665 BATTAGLIA, E.

**A system for the symbolic representation of karyotypes.**

Bull. Torrey bot. Cl. 1955 : 82 : 163-67.

Standardized methods of indicating chromosome size and morphology by means of formulae and simple diagrams are suggested and exemplified.

2666 GAMOW, G.

**Topological properties of coiled helical systems.**

Proc. nat. Acad. Sci. USA 1955 : 41 : 7-9.

Commenting on Delbrück's suggestion that the daughter helices in Watson and Crick's proposed structure of DNA might separate from the parent strands by means of successive breaks along the length of the molecule (cf. Abst. 679),

the author shows that twin helices can separate without any breakage if they are themselves wound helically around each other with the same repetition period with which they are wound in the primary helix.

2667 FEUGHELMAN, M. ET AL.

**Molecular structure of deoxyribose nucleic acid and nucleoprotein.**

Nature, Lond. 1955 : 175 : 834-38.

An emended version of Watson and Crick's twin-helical structure of DNA is presented (cf. *PBA*, Vol. XXV, Abst. 57); the Fourier transform of the revised model is in better accord with the X-ray diffraction diagram.

Possible ways in which DNA may combine with protamine are considered. It is believed that the latter molecule contains sequences of four adjacent arginine residues. The only way in which the basic end-groups of the arginine side chains can be brought into proximity with the phosphate groups of the DNA molecule is to wrap the extended polypeptide chain helically around the DNA helix. If it is further supposed that the nonbasic residues of the polypeptide chain occur as loops between the arginine molecules, it appears that loops of one residue are not possible but that two-membered loops are feasible. Sequential analysis of protamine does in fact indicate that the nonbasic residues occur almost entirely in pairs.

2668 SCHAECHTER, M. & DELAMATER, E. D.

**Mitosis of *Chlamydomonas*.**

Amer. J. Bot. 1955 : 42 : 417-22.

Mitosis is described for four species. The chromosome numbers were as follows: *Ch. moewusii*,  $36 \pm 2$ ; *Ch. eugametos*,  $36 \pm 4$ ; *Ch. reinhardi*,  $18 \pm 2$ ; and *Ch. dysosmos*,  $16 \pm 1$ .

2669 LIMA-DE-FARIA, A.

**The division cycle of the kinetochore.**

Hereditas, Lund 1955 : 41 : 238-40.

Observations on the structure and behaviour of the kinetochore during mitosis in *Galtonia candicans* and colchicine-treated *Vicia faba* and during the second meiotic division in *Agapanthus umbellatus*, together with a reexamination of the drawings of cell division processes in various plants made by other workers, lead the author to the conclusion that the kinetochore is already divided during metaphase of mitosis and in prometaphase II of meiosis and that it is therefore not responsible for holding the sister chromatids together prior to their separation at the end of metaphase (cf. *PBA*, Vol. XXIV, Abst. 811).



2670. LIMA-DE-FARIA, A.

**Structure, division and delimitation of the kinetochore in *Tradescantia*.**

Hereditas, Lund 1955 : 41 : 209-26.

The three kinetochoric zones which have been distinguished in other organisms at pachytene and metaphase of mitosis (cf. *PBA*, Vol. XIX, Abst. 763 and Vol. XXV, Abst. 1941) are visible in *Tradescantia virginiana* at metaphase and anaphase I of meiosis. At these stages of division, both in this species and in rye, the kinetochore appears to be folded and is already divided, the sister chromatids of each chromosome being held together by the proximal region of the arms (cf. Abst. 2669). At metaphase of mitosis and metaphase and anaphase I of meiosis the kinetochore is negatively heteropycnotic in *Tradescantia* chromosomes.

2671. AFANASJEVA, A. S., GLUŠČENKO, I. E. & ELLENGORN, J. A. E.

**(The process of callus formation in tomato plants).**

Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 3 : 54-70. [Russian].

An amitotic mode of cell division in the tissues of tomato stems is described. The cells of the cortex and pith immediately below the cut surface divide by sulcation and form small tabloid cells. The cells in the cambium then divide by fragmentation to form a small-celled callus.

2672. DEYSSON, M.

**Influence de l'adénosine sur la croissance et la division des cellules végétales. (Influence of adenosine on the growth and division of plant cells).**

Bull. Soc. bot. Fr. 1955 : 102 : 9-13.

Concentration of from  $10^{-4}$  to  $10^{-2}$  of adenosine inhibited mitosis in seedling peas and onion root-tips but had no mitoclastic effect. Unlike adenine (cf. Abst. 1565), very weak solutions of adenosine had no stimulating effect on cell growth or division.

2673. DEYSSON, M.

**Influence de l'acide adénylique sur la croissance et la division des cellules végétales. (Influence of adenylic acid on the growth and division of plant cells).**

Bull. Soc. bot. Fr. 1955 : 102 : 14-16.

Like adenine (cf. Abst. 1565) and adenosine (cf. Abst. 2672), adenylic acid exercises an inhibitory effect upon mitosis, concentrations of  $2 \cdot 10^{-3}$  almost completely arresting division at

preprophase. Immersion in concentrations of  $2 \cdot 10^{-3}$  for more than 2 hrs. proved lethal.

2674. FAVRET, E. A.

**Acción "a distancia" de algunos microorganismos sobre el crecimiento de la levadura. (Remote action of certain microorganisms on the growth of yeast).**

Rev. Invest. agríc. B. Aires 1953 : 7 : 147-63.

An improved technique is described whereby cultures of *Ustilago maydis* and certain other microorganisms were shown to have the effect of accelerating growth in yeast cells placed in propinquity to them. The effect was transmitted through quartz but not through glass partitions and is assumed to be a form of mitogenetic radiation.

2675. DERMEN, H.

**Location of cells and mode of mitosis.**

Genetics 1954 : 39 : 964-65. (Abst.).

Cells in L-I of the shoot apex in angiosperms almost invariably divide anticlinally, in L-II usually anticlinally but with some periclinal division, and in L-III and in the deeper layers of the apex they divide at random. Epidermal tissue in the peach fruit is one cell thick and is derived from L-I. The suture of the fruits of *Prunus* spp. corresponds to the line where the carpel edges have met; in the suture area there are thus originally two layers of cells derived from L-I. In a cytological study of  $4n-2n-2n$  or  $2n-4n-4n$  chimeras of peach, the tissue at the suture originating from L-I was generally more than two cell-layers thick. This observation is regarded as evidence that the mode of mitosis is influenced by the position of the cells in the different plant parts.

2676. DUNCAN, R. E., WOODARD, J. W. & WOODS, P. S.

**Cytological effects of sodium barbital.**

Genetics 1954 : 39 : 965-66. (Abst.).

Treatment of roots of *Allium cepa* and *Vicia faba* with a 1250 p.p.m. solution of sodium barbital caused a decrease in growth and in the mitotic index, the transition from prophase to metaphase evidently being delayed. According to photometric determination of DNA equivalent, interphase nuclei in onion root-tips treated with the above concentration belonged to the 2C, 4C and intermediate classes in the same proportion as in untreated meristems. Some system other than DNA synthesis must therefore have been affected.



2677 FAGERLIND, F.

**The mechanism of chiasma formation and crossing over. A new hypothesis.**

Hereditas, Lund 1955 : 41 : 279-84.

From the premises that the zygotene chromosomes are bilateral structures which have begun to split into chromatids and that syndesis may begin at one or several points simultaneously, it follows that if different faces of the two chromosomes come into contact at adjacent syndesis points, the chromosomes will twist. The formation of chiasmata and the crossing-over behaviour which would be occasioned by the different kinds of twisting resulting from the various types of syndesis are described and found to agree with observed facts.

2678 LOVELACE, R.

**Chromosome shattering by ultra-violet radiation (2650Å).**

Proc. nat. Acad. Sci. Wash. 1954 : 40 : 1129-35.

When desiccated pollen of *Tradescantia paludosa* was exposed to various doses of 2650 Å radiation at room temperature, chromatid and isochromatid deletions, exchanges, stickiness and other chromosomal abnormalities were observed at metaphase in the pollen-tube cells. At doses of  $10^6$  ergs/cm.<sup>2</sup> and above, shattering of the chromosomes into many small fragments occurred. It is suggested that the shattering effect was a direct one upon some constituent of the chromosomes at the time of irradiation, only those parts receiving sufficient amounts of ultraviolet rays being affected.

2679 SWANSON, C. P. & JOHNSTON, A. H.

**Radiation-induced pycnosis of chromosomes and its relation to oxygen tension.**

Amer. Nat. 1954 : 88 : 425-30.

Experiments on *Tradescantia* have shown that the pycnotic effect of radiation, as determined by counts of clumped metaphases, is markedly reduced by treatment in nitrogen instead of air. The air/N ratios for chromosomal aberrations and this pycnotic effect are approximately comparable. Pycnosis is discussed in relation to the results of *in vitro* investigations of X-irradiated DNA solutions and to the induction of chromosomal aberrations and mitotic delay by radiation.

2680 ARNASON, T. J. & MORRISON, M.

**A comparison of the effectiveness of radiations of different energies in producing chromosome breaks.**

Radiation Res. 1955 : 2 : 91-95.

In experiments on *Tradescantia paludosa*, high-

energy radiation proved to be less effective than low-energy radiation in inducing chromosome breakage. The possible cause of this disparity in efficiency is discussed in terms of differences in ionization patterns.

2681 SAX, K., KING, E. D. & LUIPPOLD, H.

**The effect of fractionated X-ray dosage on the frequency of chromatid and chromosome aberrations.**

Radiation Res. 1955 : 2 : 171-79.

The frequency of two-hit chromatid aberrations induced at prophase and two-hit chromosome aberrations induced at the resting stage in the nuclei of *Tradescantia* microspores was reduced when the X-ray dose was fractionated, this reduction in frequency being attributed to the restitution of breaks during the periods between fractionated exposures. The time during which breaks remained open depended upon the stage of nuclear activity; the breaks induced at prophase remained open less than 5 minutes whereas most of those produced at the resting stage remained open for a period approaching 1 hr. In contrast to Lane (cf. *PBA*, Vol. XXIII, Abst. 658), the authors did not find evidence of nuclear recovery with longer periods between doses.

2682 BOWEN, C. C. & SPARROW, A. H.

**Radiosensitivity of several meiotic stages of *Lilium*.**

Genetics 1954 : 39 : p. 960. (Abst.).

Late prophase showed extreme sensitivity to X irradiation compared with other stages of meiosis in *L. longiflorum* 'Croft.'

2683 SWANSON, C. P.

**Relative effects of qualitatively different ionizing radiations on the production of chromatid aberrations in air and in nitrogen.**

Genetics 1955 : 40 : 193-203.

Investigations were carried out to compare the frequencies of chromatid aberrations induced by treating inflorescences of *Tradescantia paludosa* with 50, 100 and 250 kvp X rays and 1.17-1.33 Mev  $\gamma$  radiation in air and nitrogen. With treatment in air, chromatid deletions increased and isochromatid deletions decreased in frequency as radiation of higher energy was used, but the compensatory shift in the ratio between the two types was such that the total frequency of deletions was independent of wave length. With irradiation in nitrogen, the frequency of chromatid deletions decreased with wave length, the air/nitrogen ratios for chromatid deletions being below 1.0 with 50 and 100 kvp and above 1.0 for 250 kvp and the  $\gamma$  radiation.



The frequency of isochromatid deletions showed no dependence upon quality of irradiation in an atmosphere of nitrogen. The relationship of the frequencies of chromatid exchanges to quality of the radiation was comparable to that characterizing the frequencies of chromatid deletions, although the changes in frequencies with different wave lengths were less marked. The power of the dose curve for isochromatid deletions was reduced in value with exposures in nitrogen, chiefly as the result, it is suggested, of preferential reduction in the two-hit type of isochromatid deletion. The percentage reduction in total breakage as the result of irradiation in nitrogen instead of air was more pronounced with radiation of higher energy. The author is in agreement with Thoday's hypothesis that radiation induces latent as well as actual breaks and that oxygen may exert its influence by determining the fate of latent breaks (cf. *PBA* XXIII, p. 660).

2684 STEFFENSEN, D.

**Increased frequency of X-ray-induced chromosomal aberrations in *Tradescantia* produced by a mineral-nutrient treatment.**

Genetics 1954 : 39 : 996-97. (Abst.).

When the inflorescences were X-irradiated, plants grown in depleted Hoagland's solution originally of a one-tenth concentration produced a significantly higher number of chromatid exchanges than plants raised in either regularly changed Hoagland's solution at full concentration or in soil.

**Symposium: some biological effects of radiation from nuclear detonations.**

Amer. Nat. 1954 : 88 : 209-314.

Arranged by A. Hollaender, this symposium was held at the joint session of the American Society of Naturalists and the Genetics Society of America at the meeting of the American Association for the Advancement of Science, Boston, Mass., in December 1953. The following papers are of most interest to readers of *Plant Breeding Abstracts*:—

2685 Conger, A. D. *Radiobiological studies with Tradescantia at nuclear test detonations.* (pp. 215-24).

The radiation released in such tests has not produced any new effects. With exposure of the plants to radiation in aeroplanes flown through atomic clouds at different altitudes or to the  $\gamma$ -ray component at ground level, the

readings of physical instruments provide estimates of dose equivalent to those inferred from chromosome breakage. The relative biological effectiveness of  $\gamma$  rays or neutrons did not differ significantly from that determined for either of these types of radiation when derived from laboratory sources (cf. *PBA*, XXIV, Abst. 1616). *Tradescantia* has functioned as a "dosimeter," on the basis of chromosomal aberrations, with an average accuracy of 10-15%.

2686 Lewis, E. B. *The theory and application of a new method of detecting chromosomal rearrangements in Drosophila melanogaster.* (pp. 225-39).

A new type of position effect, termed transvection, makes possible the rapid and highly efficient detection of induced rearrangements. It extends over much greater distances than usual. Wholly euchromatic as well as euchromatic-heterochromatic rearrangements can be detected by means of the effect, which is expressed only in a double heterozygote for pseudoallelic mutant genes with the  $a +/+ b$  type of arrangement. It is postulated that interference in somatic pairing in the structural heterozygote reduces the transport of an essential gene product from one chromosome to the other.

2687 Atwood, K. C. & Mukai, F. *Survival and mutation in Neurospora exposed at nuclear detonations.* (pp. 295-314).

Data on cell survival, the heterocaryotic fraction among the surviving cells and the frequency of recessive lethal mutation suggest that the effects of radiation from nuclear devices are in general similar to those induced by different types of radiation under laboratory conditions, although the neutron dose-rate was estimated as reaching 10 billion REP per sec. in one detonation.

2688 McQUADE, H. A., FRIEDKIN, M. & ATCHISON, A. A.

**Chromosome aberrations caused by radioactive thymidine.**

Nature, Lond. 1955 : 175 : 1038-39.

In experiments on root tips of onion, radioactive thymidine was much more effective than equivalent amounts of radioactive thymine in causing chromosomal aberrations, this effectiveness being associated with an intense localization of radioactivity in the thymine of deoxyribonucleic acid. Further investigations are being carried out to determine whether the breaks are



caused chiefly by discharges in deoxyribonucleic acid or by  $\beta$  particles from an extrachromosomal source.

- 2689 NUŽDIN, N. I., DOZORCEVA, R. L. & NEČAEV, I. A.  
**(Chromosomal changes in inter-specific crosses and grafts in the genus *Crepis*).**  
 Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 3 : 71-96. [Russian].

The results of cytological analyses of the root meristems of the  $F_1$  of *C. capillaris* x *C. tectorum* and of the first and second seed generations of the grafts *C. capillaris*/*C. tectorum* are discussed. Chromosomal aberrations resembling the amphiplastic changes of the sexual hybrids occurred in the progenies of the grafted material. They comprised loss of satellites, changes in chromosome number and translocations.

- 2690 MCLEISH, J.  
**Radiation sensitivity and the mitotic cycle in *Vicia faba*.**  
 Nature, Lond. 1955 : 175 : 890-91.

Roots of seedlings were treated with maleic hydrazide to induce nucleolar types of acentrics and then, when some cells had completed two mitotic cycles, they were X-irradiated (cf. Abst. 1581). Breakage detected at metaphase in cells with 3, 4 or 5 nucleolar organizers was significantly lower than in cells with 2 organizers in material fixed 6 and 10 hours after irradiation. It is suggested that the differences in sensitivity may be related to the role played by the nucleolus in DNA synthesis during interphase and that the presence of extra nucleolar organizers favours restitution.

- 2691 TRUHAUT, R. & DEYSSON, G.  
 Action radiomimétique de la NN'N" triéthylène-phosphoramide sur les mitoses des cellules végétales; essais de protection par la  $\beta$ -mercaptoéthylamine. **(Radiomimetic action of NN'N" triethylene phosphoramide on mitosis in plant cells; attempts at protection by  $\beta$ -mercaptoethylamine).**  
 CR Acad. Sci., Paris 1955 : 240 : 1568-70.

NN'N" triethylene phosphoramide inhibited mitosis at the preprophase stage and gave rise to minor irreversible chromosomal aberrations in experiments on root-tip cells of *A. cepa*. Previous treatment of the root tips with  $\beta$ -mercaptoethylamine afforded no protection.

- 2692 D'AMATO, F.  
 Di alcuni aspetti fisiologici e genetici dell'invecchiamento dei semi. Contributo al problema della senescenza e della mutabilità spontanea nei vegetali. **(On some physiological and genetic aspects of seed aging. A contribution to the problem of aging and of spontaneous mutability in plants).**  
 Caryologia 1954 : 6 : 217-40.

A review is given of some of the literature dealing with the effects of aging on the germination of seeds in various species, on the properties of the seedlings, and on the incidence of chromosome aberrations and of gene mutations. The question as to whether the loss of germinating capacity is a cause or an effect of the rise in mutability is not regarded as finally decided.

- 2693 WOLFF, S. & BORSTEL, R. C. VON  
**The effects of pre- and postirradiation centrifugation on the chromosomes of *Tradescantia* and *Vicia*.**  
 Proc. nat. Acad. Sci. Wash. 1954 : 40 : 1138-41; and Genetics 1954 : 39 : p. 1001. (Abst.).

When inflorescences of *Tradescantia* were centrifuged before exposure to X irradiation, the number of two-hit aberrations decreased as compared with material irradiated only. Centrifuging after irradiation caused an increase in the number of two-hit aberrations, provided it began immediately upon the cessation of irradiation. An increased number of aberrations was also obtained with as much as a 10 minute interval between irradiation and centrifuging, if the plants were kept at 7° C. to prevent rejoining during this interval. Similar results were obtained in experiments with *Vicia* seeds. The effects of centrifuging are explained on the basis of physically induced compression or movement of the chromosomes. As shown by tests on *Tradescantia*, if irradiation took place in nitrogen a posttreatment of centrifuging did not increase the number of aberrations; this result provides further support for the hypothesis that rejoining occurs in a shorter time after irradiation under anaerobic conditions.

- 2694 SHARMA, A. K. & DEEPESH DE  
**Gallic acid: its importance in cytochemical studies.**  
 Caryologia 1954 : 6 : 180-89.

The cytological effects of gallic acid have been investigated by means of the *Allium* test (cf. PBA, Vol. XIX, Abst. 2365). A reversible



subnarcotic effect was brought about by concentrations ranging from 0.001 to 0.005 M. Intact root-tips, however, required a longer period of treatment at the same concentration and temperature than excised root-tips before this effect was produced. It is suggested that fragmentation may indicate not only a subnarcotic condition, as suggested by Levan, but also the initiation of lethality. With a concentration of 0.0005 M, temperature of 10–14° C. and treatment lasting 3 to 4½ hours, the chromosome structure becomes clearly defined as the result of differential contraction and swelling of the arms.

2695 AVANZI, S.

Osservazioni sull'attività citologica della 8-aminochinolina e di due derivati naftolici. (**Observations on the cytological action of 8-aminoquinoline and of two naphthol derivatives**).

Caryologia 1954 : 6 : 128–33.

By the use of the *Allium* test, 8-aminoquinoline, 5-amino-1-naphthol and 4-amino-1-naphthol were all shown to induce chromosome breakage, though their action was weak and partial breakage was frequent. The most active compound was 8-aminoquinoline.

C-mitoses with typical preprophase inhibition of division in resting nuclei (cf. *PBA*, Vol. XVIII, Abst. 714) were obtained with high concentrations of the three substances.

2696 D'AMATO, F. & D'AMATO-AVANZI, M. G.  
**The chromosome-breaking effect of coumarin derivatives in the *Allium* test.**

Caryologia 1954 : 6 : 134–50.

Coumarin and its derivatives 3-methylcoumarin, 4-methylcoumarin, 7-methoxycoumarin, 4-methyl-7-hydroxycoumarin and 6-methoxy-7-hydroxycoumarin induced aberrations due to breakage of unsplit chromosomes at the resting stage and also pseudochiasmata.

2697 SHARMA, A. K. & SEN, S.

**Induction of division through nucleic acid treatment.**

Caryologia 1954 : 6 : 151–59.

Treatment of *Allium* root-tips with a 0.01% solution of nucleic acid induced the division of polyploid cells formed before the treatment and also somatic reduction. These two phenomena are interpreted in terms of the change brought about in the nucleic acid charge of the chromosomes as the result of the addition of nucleic acid to the medium.

2698 D'AMATO, F.

Osservazioni cito-istologiche sulla attività antimitotica e rizogena della cumarina e di cinque suoi derivati. (**Cyto-histological observations on the antimitotic and rhizogenic activity of coumarin and five of its derivatives**).

Caryologia 1954 : 6 : 160–79.

Solutions of the six substances tested on *Allium cepa* bulbs all showed a typical preprophase inhibition effect on caryokinesis (cf. *PBA*, Vol. XXI, Abst. 87) and with doses above the threshold for their effect may exert a toxic action on prophase or arrest metaphase.

The c-tumour reaction induced by the coumarins in question is not associated with any stimulation of mitosis in the cortical and medullary cells of the elongation zone of the roots (cf. *PBA*, Vol. XXI, Abst. 87).

2699 SAEZ, F. A. & DRETS, M. E.

**Cytological alterations induced by "Gonyleptidin" during cell division.**

Genetics 1954 : 39 : p. 1003. (Abst.).

Investigations were carried out on the effects of Gonyleptidin, a volatile antibiotic of animal origin, upon roots of *Allium cepa* and orthopteran germ cells. Chromosome fragmentation and pulverization, with diffusion of DNA into the cytoplasm and concomitant reduction in intensity of nuclear staining, were especially conspicuous in the onion cells. Other effects included alterations in the helicoidal cycle, diplochromosomes, delayed division of the centromere, polyploidy, blocking of mitosis and interchromosomal coalescence of varying degrees.

2700 DEYSSON, G. & TRUHAUT, R.

Étude de l'action radiomimétique exercée par la triéthylène-mélatine sur les méristèmes radiculaires de l'*Allium cepa* L. (**Study of the radiomimetic action exercised by triethylene melamine on the root meristems of *A. cepa* L.**).

CR Acad. Sci., Paris 1955 : 240 : 1459–61.

Triethylene melamine was shown to have a mitostatic effect on the root-tip cells of *A. cepa*, followed by a mitodepressive action. Chromosome stickiness and fragmentation were frequent and a number of micronuclei were observed.

2701 DEYSSON, M.

Altérations chromosomiques provoquées par la guanine chez l'*Allium cepa*. (**Chromosome disturbances brought about by guanine in *A. cepa***).

CR Acad. Sci., Paris 1955 : 240 : 2006–08.

Treatment of root-tip cells of *A. cepa* with

concentrations of over  $10^{-4}$  of guanine hydrochloride induced bridge formation and chromosome fragmentation at anaphase. These disturbances were most marked at concentrations slightly weaker than those possessing a lethal effect.

- 2702 BHATTACHARYA, S. S. & LINSKENS, H. F. Über den Einfluss von "Systox," "Metasystox" und "Pestox" auf die Kerne und Chromosomen von *Vicia faba*. (On the influence of "Systox," "Metasystox" and "Pestox" on the nuclei and chromosomes of *V. faba*). Phytopath. Z. 1955 : 23 : 233-48.

In experiments at the Botanical Institute of Cologne University the above insecticides, which achieve their effect after their passage into the cell sap, were found to impede mitosis and meiosis in *V. faba* when the roots were immersed in water containing solutions of more than 0.001%. Systox is a mixture of the diethylthiophosphoric and diethylthionophosphoric esters of  $\beta$ -oxyethylthioethyl ether and Metasystox a mixture of the dimethylthiophosphoric and dimethylthionophosphoric esters of the same compound. Pestox (octamethyltetraphosphoric amide) is somewhat less toxic to the nuclei and chromosomes of *V. faba* than are the other two mixtures. In the case of all three products, concentrations of above 0.1% led to disintegration of the nuclei. Concentrations of 0.01-0.1% for 24 hr. resulted in chromosome stickiness and fragmentation during mitosis, the cells recovering from these effects within a further 48 hr. provided the treatment was discontinued. Meiotic division was arrested and fertility greatly reduced by the same treatment. Concentrations of 0.05-0.1% are, however, considered safe for spraying growing crops as the preparations are diluted before being absorbed by the plants, which quickly recover from any adverse effects.

- 2703 SMITH, H. H. & LOTFY, T. A. Comparative effects of beta-propiolactone and ceepryn (cetyl pyridinium chloride) on chromosomes of *Vicia* and *Allium*. Genetics 1954 : 39 : p. 994. (Abst.).

When root meristems of *V. faba* were treated with single doses of .02% and .04%  $\beta$ -propiolactone (BP1) for  $\frac{1}{2}$  hour, the average effect of the two treatments was the production of 13.5% cells with aberrant divisions. Of these cells 67% contained fragments only and 24.5% bridges only, the remainder showing various

other irregularities. Single-dose treatments with .001% and .002% ceepryn (Cp) for  $\frac{1}{2}$  hour produced an average of 6.3% aberrant cells, of which 27.1% had fragments only and 71.2% bridges only. BP1 treatments gave fragments of different sizes in the following proportions: 81%, large; 16.2%, medium-sized; and 2.8%, small. Corresponding figures for Cp treatments were 0%, 22.7% and 77.3% respectively. Two doses of either substance, separated by an interval of 24 hours, increased the frequency of smaller fragments, indicating the occurrence of additional sites of breakage. The effects of combined treatments with both compounds varied according to the order of application. Treatment of root tips of *A. cepa* with single doses of BP1 induced a much higher percentage of small fragments than in *V. faba*. The results are explained in terms of (1) the difference in heterochromatin distribution in the chromosomes of *Allium* and *Vicia* and (2) the difference between the mode of action of the two substances, Cp being a cationic surface-active denaturant and BP1 a highly active alkylating agent.

- 2704 CROW, J. F. Random mating with linkage in polysomics. Amer. Nat. 1954 : 88 : 431-34.

A mathematically more elementary way of deriving the formulae for the approach to equilibrium of linked loci in panmictic populations of tetrasomic or hexasomic organisms established by Bennett is presented (cf. *PBA*, Vol. XXIV, Abst. 2611). The method is exemplified in detail with reference to tetrasomic inheritance, and a table of the probabilities of AB and A/B chromosomes for each of the 11 classes of gamete formation in tetraploids enumerated by Fisher (cf. *PBA*, Vol. XVII, Abst. 1381) is given.

- 2705 LYSENKO, T. D. [Editor] (Concerning an article by Heribert Nilsson). Agrobiologija (Agrobiology) 1955 : No. 2 : 143-44. [Russian].

The Mičurinist standpoint that polyploidy can give the plant breeder little of practical value (cf. *PBA*, Vol. XVIII, Abst. 2000) is restated and Soviet advocates of the resumption of studies on polyploidy (cf. Abst. 177) are referred to an article by Nilsson in which polyploids are attributed with low fertility and reduced yield.



2706 FERRARY, R.

Étude comparée de l'activité stathmocinétique de la colchicine et de la thio-colchicine. (**Comparative study of the stathmocinetic action of colchicine and thiocolchicine**).

CR Acad. Sci., Paris 1955 : 240 : 1717-19.

Thiocolchicine, a derivative of colchicine, was found to exercise a more pronounced mitoclastic action and to be more rapid and lasting in its effect than colchicine. It is suggested that thiocolchicine may be of value in attempts to polyploidize species that have proved insensitive to colchicine.

2707 NYGREN, A.

**Polyiploids in *Melandrium* produced by nitrous oxide.**

Hereditas, Lund 1955 : 41 : 287-90.

Shortly after being pollinated, crosses between *M. album* and the closely related species *M. divaricatum* and *M. boissieri* were treated with nitrous oxide at a pressure of 2-10 atmospheres for 4-48 hours (cf. *PBA*, Vol. XXIV, Abst. 2671). Plants treated for more than 16 hours set no seed. From the remaining 27 plants 134 seeds were produced, of which 81 were polyiploids. A pressure of five atmospheres gave the highest proportion of polyiploids among the progeny.

2708 BECKER, G. & SKIEBE, K.

Eine neue Methode der Colchicinbehandlung. (**A new method of colchicine treatment**).

Züchter 1955 : 25 : 161-63.

The method described consists of placing the stems of cuttings in a 0.01-0.1% colchicine solution for 24-96 hours, strength of solution and length of treatment depending on the species employed. The cutting is then grafted on a vigorous stock and kept for 14 days at a temperature of 20° C. and a relative humidity of 90-95%.

2709 BRUHIN, A.

Über die polyiploidisierende Wirkung eines Samenbeizmittels. (**On the polyiploidy-inducing effect of a seed disinfectant**).

Phytopath. Z. 1955 : 23 : 381-94.

At the Institute of Botany, Zürich University, immersion of seeds of *Crepis capillaris* and *Avena sativa* in dilute solutions of the mercurial fungicide Agrimax M induced disturbances at mitosis and frequent cases of polyiploidy and aneuploidy were observed. The effect of Agrimax M on mitosis was in most respects similar to that of colchicine, but it was less poisonous.

Caution is advocated in the use of this fungicide as growth, fertility and fruit set may be adversely affected by the occurrence of polyiploidy and aneuploidy.

2710 REVUCKAJA, P. S.

(**The problem of cell formation *de novo* and the scepticism of some scientists**).

Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 2 : 41-58. [Russian].

Research on the origin of plant and animal cells or nuclei *de novo* is surveyed, Lepešinskaja's theories being accepted (cf. *PBA*, Vol. XXI, Abst. 1509). It is stated however that the experiments by Lepešinskaja and her supporters have been impaired by faulty methods. Her new theories are regarded as an advance upon those of Virchow and Morgan and their rejection by some Soviet scientists is deprecated.

2711 ELLENGORN, J. E., GLUŠČENKO, I. E. & RJABININA, M. N.

(**Amitotic modes of division in plant cells**).

Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 2 : 59-82. [Russian].

Research dealing with the multiplication of nuclei by means other than simple division is surveyed and an aberrant method of nuclear formation observed in the tissues of *Allium odorum* is described. A cavity was formed at the chalazal end of the ovule; this was occupied by noncellular protoplasm which gave rise to enucleate precells. Later these precells produced endogenous nuclei. Finally the nuclei became charged with deoxyribonucleic acid, which had previously been lacking.

## BOTANY

Huitième Congrès International de Botanique, Paris 1954. Rapports et communications parvenus avant le congrès aux sections 21 à 27. (**Eighth International Botanical Congress, Paris 1954. Reports and communications presented to the Congress in sections 21 to 27**). Pp. 252.

The following summaries are abstracted from sections 21, 24 and 26, dealing with bacteriology, antibiotics in plant biology and the history of botany, respectively.

2712 Parker, T. & Allen, O. N. *Some properties of alfalfa rhizobiophages*. (pp. 10-11).

At the Department of Bacteriology of the University of Wisconsin, four strains of rhizobiophage, designated P103, P107-1, P127 and

P135 respectively, were isolated. The strains differed in (1) plaque size and morphology; (2) heat inactivation rates and thermal death points; (3) latent growth period; and (4) serological properties. None of the phages lysed all the strains of *Rhizobium meliloti* tested.

2713 Delaporte, B. *État actuel de nos connaissances sur la cytologie bactérienne. (Present state of our knowledge of bacterial cytology).* (pp. 23-33).

Recent research on the structure and cytology of bacteria is summarized.

2714 Bisset, K. A. *The cytology and reproductive elements of nitrogen-fixing bacteria.* (p. 34).

A brief note on the cytology and reproductive processes of *Rhizobium* sp. and *Azotobacter* sp. is given.

2715 Bisset, K. A. *Cytological information in bacterial systematics.* (pp. 34-36).

Criteria to be employed in studying the morphology and cytology of bacteria with a view to obtaining information on the relationships between different types of bacteria and between bacteria and other biological groups are outlined.

2716 Teillon, J. *Sensibilité et résistance des Streptomyces aux antibiotiques. (Sensitivity and resistance of Streptomyces to antibiotics).* (p. 125).

Differences in the reactions of species of *Streptomyces* to various antibiotics are mentioned briefly. By exposing a strain of *S. griseus* to successively increased concentrations of chlorotetracycline and oxytetracycline, a variant resistant to concentrations of 500  $\gamma$ /cc. of these antibiotics has been obtained at the Sofrapen Research Institute, Roumainville.

2717 Merrill, E. D. *The significance of the botany of Cook's voyages.* (pp. 175-76). Reference should be made to p. 636.

2718 Fothergill, P. G. *An approach to evolution.* (p. 193).

The importance of a study of the evolutionary idea is stressed.

2719 Zimmermann, W. *Der Evolutionsgedanke in Vergangenheit und Gegenwart. (The concept of evolution in the past and at the present time).* (pp. 194-95).

A brief historical account of evolutionary concepts since pre-Christian times is presented.

2720 Jeffreys, M. D. W. *The history of maize in Africa.* (pp. 214-15).

The substance of the argument put forward by the author has been discussed at greater length

elsewhere (cf. *PBA*, Vol. XXIV, Abst. 307 and 2941 and Vol. XXV, Absts. 1963-6).

2721 Collins, J. L. *Notes on the history of the pineapple.* (pp. 215-17).

The history of the pineapple is discussed briefly (cf. *PBA*, Vol. XXI, Abst. 2149 and Vol. XXII, Abst. 725).

2722 TER-AVANESJAN, D. V.

**(The role of number of pollen grains per flower in fertilization in plants).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 119-33. [Russian].

Emasculated flowers of the American cotton S-15 and of *Vigna catjang* were pollinated with known numbers of pollen grains, varying from 5 to 1000. In cotton, seeds from flowers pollinated with 5, 20, 100 and 300 grains were larger than those from open pollination, those from 1000 pollen grains showed no increase. The progeny from plants pollinated with less than 300 grains showed marked variation from plant to plant, the variation being progressively greater with reduction of the pollen grain number. In *V. catjang* variation was observed only in the progenies of pollinations with 15, 30 and 50 pollen grains. A similar increase in variation was observed in the progeny of the spring wheat Graecum 433 when pollination was performed with 1, 20 and 100 pollen grains. When 20 pollen grains were placed on the stigma of an emasculated cotton plant the pollen tubes reached the ovule after 15 hours, whereas they only took 8 hours when an unlimited number of pollen grains was used; further observations have shown that from the 200 pollen grains that germinated some 60-80 pollen tubes reached the ovary.

Emasculated flowers of the green-leaved cotton S460 belonging to *Gossypium hirsutum* were pollinated with a mixture of self pollen and pollen of a red-leaved variety of the same species, some flowers receiving a large quantity of the pollen mixture, others only 20 grains from each variety. From the former group 16 bolls were obtained, yielding 404 seeds, from the latter group 12 bolls, yielding 114 seeds. The progeny of the former group contained 47% of plants with green leaves and 53% with red leaves of intermediate shade; the progeny from the group with limited pollination contained 88% of green and only 12% of red plants. These results are compared with some findings in experiments with animals, in which insemination with a limited amount of sperm led to a more pronounced selective effect in fertilization.



- 2723 BHATTACHARJYA, S. S. & LINSKENS, H. F.  
**Recent advances in the physiology of self-sterility in plants.**

Sci. & Cult. 1955 : 20 : 370-73.

A brief survey is presented of investigations by the second of the above authors, Straub, Lewis and others on the physiological and biochemical nature of self sterility. Recent investigations point to an immunity reaction involving an antigen-antibody system as the basis of the self-sterile response.

- 2724 RUTISHAUSER, A. & HUNZIKER, H. R.  
 Weitere Beiträge zur Genetik der Aposporie pseudogamer Potentillen. (**Further contributions on the genetics of apospory in pseudogamous forms of Potentilla**).

Arch. Klaus-Stift. VererbForsch. 1954 : 29 : 223-33.

By interspecific hybridization and back crossing of *Potentilla* spp., in conjunction with embryological studies, evidence has been obtained indicating that, like generative apospory, somatic apospory is genetically conditioned.

A possible connexion between the degree of polyploidy present and the manifestation of apomixis in *Potentilla* is discussed.

- 2725 DVORJANKIN, F. A.  
 (In defence of the Mičurinite theory of ontogeny).

Uspehi Sovrem. Biol. (Advanc. in Mod. Biol.) 1955 : 39 : 111-22. [Russian].

The turn taken by the discussion on biology in Soviet journals is deplored and reviews of the present situation are stated to represent only one viewpoint, namely that of Lysenko's opponents. In particular the writer disapproves of (1) the acceptance of intraspecific competition, which he associates with Malthus and Morganist genetics, (2) the rejection of the theory of interspecific conversion, and (3) critical comments on Lysenko's theory of phasic development. The proposal made by some writers that a new comprehensive theory of ontogeny could be founded by the conflation of Lysenko's theory with Krenke's concept of cyclic development is rejected.

- 2726 BORRISS, H. & KROLOP, H.  
 Über physiologische Wechselwirkungen zwischen Pollen verschiedener Pflanzenarten. (**On physiological mutual reactions between pollen of different plant species**).

Naturwissenschaften 1955 : 42 : 301-02.

In experiments at the Ernst-Moritz-Arndt

University, Greifswald, Germany, the addition of pollen of *Gagea lutea*, *Orobis vernus* and *Clivia miniata* to pollen of *Forsythia* spp. in sugar solutions or in solutions of 0.001-0.01% boric acid resulted in an increased percentage of germination and an accelerated growth of the pollen tubes of the *Forsythia* species. Similar results were obtained with some other combinations of species. The addition of pollen of *Gaillardia pulchella* to that of *Impatiens scabrida* or of pollen of *I. scabrida*, *Gaillardia pulchella* or *Doronicum plantagineum* to that of *Tradescantia virginica* impeded pollen germination and pollen-tube growth in *I. scabrida* and *T. virginica*, respectively. The results of these experiments are interpreted as being inconsistent with Golubinskii's thesis that pollen from plants growing in natural association have a mutually beneficial effect and that inhibition of germination and pollen-tube growth is found only between pollen grains of plant species that are never found growing together under natural conditions.

- 2727 ERNST, A.  
**Self-fertility in monomorphic primulas.**

Genetica 1955 : 27 : 391-448.

A review is given of the author's earlier papers on the relation between monomorphism, homostyly and fertility and the inheritance of factors controlling compatibility in the various sections of the genus *Primula* (cf. *PBA*, Vol. XX, Abst. 2034 and Vol. XXII, Absts. 74, 896 and 2389).

Huitième Congrès International de Botanique, Paris 1954. Rapports et communications parvenus avant le congrès aux sections 2, 4, 5 et 6. (**Eighth International Botanical Congress, Paris 1954. Reports and communications presented to the Congress in sections 2, 4, 5 and 6**). Pp. 286.

Section 2 of the above report is devoted to questions relating to nomenclature, section 4 deals with taxonomy, systematics and phylogeny and sections 5 and 6 are concerned with paleobotany and palynology.

- 2728 Just, T. *Modern systems of classification of the plant kingdom.* (p. 1).

Problems relating to plant systematics are discussed in general terms.

- 2729 Erdtman, G. *Palynology and plant taxonomy.* (pp. 28-36).

The relationship between pollen morphology and plant taxonomy is discussed.

- 2730 Mirov, N. T. *Studies of the chemical composition of turpentine of the genus Pinus in relation to taxonomy.* (pp. 47-49).

Variations in the chemical composition of the turpentine found in different species and interspecific hybrids of *Pinus* are reported. It is suggested that a knowledge of the chemical composition of species within a taxonomic group assists in their classification.

- 2731 Björkman, S. O. *Observations sur la taxinomie et la caryologie des espèces Calamagrostis tenella, Agrostis rupestris, A. borealis et A. rubra.* (Observations on the taxonomy and caryology of the species *C. tenella*, *A. rupestris*, *A. borealis* and *A. rubra*). (pp. 56-58).

The taxonomic relationships between the above four species are discussed and evidence is put forward to support the view that *C. tenella* has been misclassified and should be placed in the genus *Agrostis*. It is further claimed that *A. rubra* is not identical with *A. borealis*, as many authors suppose, but is a natural hybrid between *A. rupestris* and *C. tenella*.

- 2732 Rothmaler, W. *Terminologie des subdivisions de l'espèce.* (Terminology of the subdivisions of the species). (pp. 67-74).

The terms species, subspecies, variety, form and subform are defined.

- 2733 Vasconcellos, J. de C. and Amaral Franco, J. do. *Les chênes du Portugal.* (The oaks of Portugal). (p. 116).

The authors point out that much confusion exists in the identification and classification of Portuguese oaks, partly because of the considerable amount of interspecific hybridization that has occurred. The following species are recognized as being native to Portugal: *Quercus robur*, *Q. pyrenaica*, *Q. canariensis*, *Q. faginea*, *Q. lusitanica* (= *Q. fruticosa*), *Q. suber*, *Q. ilex* ssp. *rotundifolia* and *Q. coccifera*.

- 2734 Fritsch, F. E. *Evolutionary trends among algae in relation to the origin of vascular plants.* (pp. 143-50).

A comparative study of present-day algae is presented, with a view to providing suggestions as to the possible evolutionary sequence in higher plants.

- 2735 Czecczot, H. *The past and present distribution of Pinus halepensis Mill. and Pinus brutia Ten.* (pp. 196-97).

The past and present distribution of *P. halepensis* and *P. brutia*, and the taxonomic position of these two species, are discussed. The author considers *P. pithyusa* and *P. eldarica* to be

synonymous with *P. brutia*. Sporadic hybridization appears to have occurred between *P. halepensis* and *P. brutia* in the Adriatic region.

- 2736 Sosa-Bourdoul, C. *Composition chimique des pollens et systématique.* (Chemical composition of pollen grains and systematics). (pp. 251-53).

The value of a study of the chemical constituents of pollen grains in plant classification is discussed.

- 2737 CLIFFORD, H. T.

### An index for use in quantitative taxonomic problems.

New Phytol. 1955 : 54 : 132-37.

A geometrical method of discriminating between two taxonomic populations which vary in respect of two quantitative characters is described. The two quantitative characteristics are used as coordinates and each individual of the two populations is plotted. Assuming now that the points plotted fall into two groups corresponding to the two populations and that the two quantitative characters are correlated, correlation lines can be drawn for each population. Next, a construction line is drawn bisecting the angle between the correlation lines, and at right angles to the construction line an index line is drawn calibrated according to an arbitrary scale. Index values for each of the points plotted are then read off on the scale of the index line and these values, when replotted as frequency polygons, provide a better separation of the two populations than is obtainable by the use of frequency polygons involving only one quantitative character.

- 2738 TURRILL, W. B.

### The taxonomic importance of hybridization.

God. biol. Inst. Sarajevu 1952 : 5 : 429-36.

The significance of hybridization for plant classification and the relations between phylogeny and taxonomy are briefly discussed.

## DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

Huitième Congrès International de Botanique, Paris 1954. Rapports et communications parvenus avant le congrès aux sections 18, 19 et 20. (Eighth International Botanical Congress, Paris 1954. Reports and communications presented to the Congress in sections 18, 19 and 20). Pp. 227.

Sections 18, 19 and 20 of the above report are concerned with lichenology, mycology and plant



pathology respectively. The following articles are considered to be of interest to plant breeders and geneticists.

- 2739 *Olive, L. S. Sexuality of the Ascomycetes.* (pp. 67-71).

Recent research on the different modes of sexual reproduction found in the Ascomycetes is reviewed.

- 2740 *Carr, A. J. H. Variation in the homothallic fungus Sclerotinia trifoliorum Eriksson.* (pp. 72-74).

Numerous biotypes were isolated, but no evidence for the existence of distinct biological races was found. It is suggested that heterocaryons may arise in plants simultaneously infected by different genotypes of the fungus, subsequent segregation giving rise to a large number of new biotypes. The significance of the appearance of these new biotypes in breeding clover for resistance to *S. trifoliorum* is indicated.

- 2741 *Batts, C. C. V. The susceptibility of wheat and barley varieties to loose smut (Ustilago nuda) in England.* (pp. 142-43).

Work at the National Institute of Agricultural Botany, Cambridge, England, on testing for resistance to *U. nuda* is reviewed briefly. In wheat, at least two physiological races of the fungus have been identified. Vilmorin 27, Hybrid 46 and Fylgia, all of which were 70% infected, appear to be susceptible to both races. Bersée, Eclipse, Pilot and Yeoman are susceptible to only one race. The least susceptible varieties were Atle, Alba and Victor, in which approximately 6% of the grains were infected. Difficulties encountered in testing barley varieties for resistance to *U. nuda* are mentioned and information is given on differences in degree of susceptibility between winter and spring varieties.

- 2742 *Wahl, I. Crown rust and stem rust on oats in Israel.* (p. 144).

Information on varietal differences in the susceptibility of introduced varieties is given, together with observations on the prevalence and distribution of physiological races of both rusts in Israel.

- 2743 *Carr, A. J. H. Breeding red clover for resistance to clover rot disease.* (pp. 155-57).

Selection work in progress at the Welsh Plant Breeding Station, Aberystwyth, is described. Although no immune types have been found, it is considered likely, on the basis of experiments carried out so far, that the resistance of a given strain can be improved by careful selection

and breeding. Wild unselected material from the northern Mediterranean, the putative centre of origin of the species, is at present being tested with a view to finding additional genes for resistance.

- 2744 *Miczynski, K. A. The mutations of the potato virus X induced by ultrasonics.* (pp. 213-14).

The author presents the results of experiments at the University of Cracow, Poland, in which mutations in a strain of potato virus X appear to have occurred as the result of subjection to ultrasonic waves (cf. Abst. 748).

- 2745 *Noordam, D. Cucumber mosaic virus strains and some of their properties.* (pp. 219-21).

The results of investigations of the comparative pathogenicity and serological properties of four strains of the cucumber mosaic virus are given.

- 2746 **The principles of microbial classification. A report of the discussion meeting of the Society for General Microbiology, September, 1954.**  
J. gen. Microbiol. 1955 : 12 : 314-86.

The contributions included a paper on the impact of genetics by G. Pontecorvo, who expressed the view that although so far genetics has not influenced microbial systematics it will in due course play as important a role in this field as it has in the systematics of higher organisms.

- 2747 **ELLISON, S. A., ERLANGER, B. F. & ALLEN, P.**  
**The chemical reversal of ultraviolet effects on bacteria.**  
J. Bact. 1955 : 69 : 536-40.

The lethal and mutagenic effects of ultraviolet irradiation on *Escherichia coli* strain B and *Corynebacterium bovis* were reversed by plating the irradiated bacteria in nutrient agar to which sodium acetate had been added.

- 2748 **JENKIN, C. R. & ROWLEY, D.**  
**Resistance to colicin E as a genetic marker in *E. coli* K12.**  
Nature, Lond. 1955 : 175 : p. 779.

The locus  $E^R$  for resistance to colicin E has been found to be situated between *M* for methionine utilization and *B*<sub>1</sub> for thiamin utilization.

- 2749 **LIEB, M., WEIGLE, J. J. & KELLENBERGER, E.**  
**A study of hybrids between two strains of *Escherichia coli*.**  
J. Bact. 1955 : 69 : 468-71.

The majority of the recombinants obtained from a cross between two strains of *E. coli*,

K125 and C, were found to carry the phage resistance and the streptomycin and lactose fermentation markers of the latter parent. Many of the recombinants were intermediate morphologically between the two parental strains. Cell size and nuclear morphology were inherited as independent characters.

2750 SCHAEFFER, P. & RITZ, E.

Transfert interspécifique d'un caractère héréditaire chez des bactéries du genre *Hemophilus*. (**Interspecific transfer of an inherited character in bacteria of the genus *Hemophilus***).

CR Acad. Sci., Paris 1955 : 240 : 1491-93.

Treatment of cells of *H. influenzae* with deoxyribonucleic acid from a strain of *H. parainfluenzae* resulted in the transfer of some hereditary characters from the latter to the former species. The occurrence of such induced changes between different species was, however, considerably less frequent than when intra-specific transfers were effected.

2751 JACOB, F. & WOLLMAN, E. L.

Étapes de la recombinaison génétique chez *Escherichia coli*. (**Stages of genetic recombination in *E. coli***).

CR Acad. Sci., Paris 1955 : 240 : 2566-68.

Three stages in the process of recombination in crosses between different strains of *E. coli* are distinguished: (1) conjugation; (2) transfer of chromosome segments from the donor to the receiving strain and (3) integration.

2752 WOLLMAN, E. L. & JACOB, F.

Sur le mécanisme du transfert de matériel génétique au cours de la recombinaison chez *Escherichia coli* K12. (**On the mechanism of the transference of genetic material in the course of recombination in *E. coli* K12**).

CR Acad. Sci., Paris 1955 : 240 : 2449-51.

In crosses between the two lysogenic mutants Hfr and F<sup>-</sup> of *E. coli* 'K12' (cf. Abst. 1608) it was observed that the transference of genetic characters from Hfr to F<sup>-</sup> takes place in a predetermined sequence. By mechanical shaking it is possible to arrest this process at any given stage and so regulate the genetical constitution of the hybrid population.

2753 FORRO, F.

**P<sup>32</sup> distribution among the progeny of labeled bacteria.**

Genetics 1954 : 39 : 966-67. (Abst.).

The results of investigations on *Micrococcus cryophilus* indicated a randomization of the labelled phosphorus component of deoxyribose

nucleic acid (DNA) among the progeny, a model based on the partition of the DNA into more than four segregating and chemically stable units per organism being required.

2754 HUGHES, W. H.

**The differences in antibiotic sensitivity of closely related single cells of *Proteus vulgaris*.**

J. gen. Microbiol. 1955 : 12 : 269-74.

Evidence has been obtained that when a single bacterial cell divides the daughter cells are frequently unlike each other with respect to sensitivity to antibiotics. There is no reason to suppose that transformation, transduction or any form of genetic recombination is involved in such variation which may arise through an alteration in the spatial relationship of genes or their equivalents prior to cell division, or through unequal distribution of cytoplasmic elements.

2755 EPHRUSSI-TAYLOR, H.

**Attempt at isolation of desoxyribonucleoprotein from pneumococci.**

Biol. Bull., Wood's Hole 1954 : 107 : p. 325. (Abst.).

Extracts derived from a streptomycin-resistant strain and capable of transforming streptomycin-sensitive pneumococci into resistant ones contained appreciable amounts of protein, ribonucleic acid and deoxyribonucleic acid. The transforming principle was probably present in a bound or aggregate form since activity increased 100-1000 times upon dilution.

2756 WERNER, B., WHALLON, J. & MAUZY, W. L.

**Further data on the selective effects of DNA upon bacterial population changes.**

Genetics 1954 : 39 : p. 962. (Abst.).

The occurrence of a nonspecific selective effect as a result of treating *Brucella* strains with deoxyribose nucleic acid (DNA) in combination with DNase has been already reported (cf. Abst. 705). Further investigations have indicated that the intensity of the selective effect depends to a considerable extent upon the production of a compound by the rapidly established mutant cells in the presence of enzyme-treated DNA. Medium-dependent selective effects were also detected when cultures supplemented by only DNA or only DNase were used; the cells themselves may therefore produce both DNA and DNase, the medium-dependent selective effects apparently being correlated with medium-conditioned differences in the ability of DNase to act upon DNA.



- 2757 RYAN, F. J., SCHWARTZ, M. & FRIED, P.  
**The direct enumeration of spontaneous and induced mutations in bacteria.**

J. Bact. 1955 : 69 : 552-57.

The method described consists of counting the number of mutant papillae on the surface of the colonies under study.

- 2758 RYAN, F. J.  
**Phenotypic (phenomic) lag in bacteria.**

Amer. Nat. 1955 : 89 : 159-62.

When wild-type cells of *Escherichia coli* were treated with ultraviolet rays to a survival point of *ca.*  $10^{-2}$  and introduced immediately into a minimal medium containing 150 units of penicillin per ml., auxotrophic mutants occurred with a frequency of  $5.9 \times 10^{-6}$  among the bacteria surviving irradiation. Mutations were induced, it is suggested, which did not involve a detectable phenotypic delay so that the mutants ceased growth on the minimal medium and were thus protected from the lethal action of penicillin.

- 2759 GIBSON, F., JONES, M. J. & TELTSCHER, H.

**Synthesis of indole and anthranilic acid by mutants of *Escherichia coli*.**

Nature, Lond. 1955 : 175 : 853-54.

Resting-cell suspensions of some induced mutants with various growth-factor requirements showed the following behaviour. Mutant 1, requiring tryptophane for growth, formed indole from glucose +  $\text{NH}_4\text{Cl}$ . Mutant 2, requiring tryptophane + serine or glycine, synthesized indole from glucose +  $\text{NH}_4\text{Cl}$  only in the presence of serine. Mutant 3, with a growth requirement for tryptophane or indole, produced anthranilic acid from glucose +  $\text{NH}_4\text{Cl}$ , but mutant 4, requiring tryptophane or indole + serine or glycine, synthesized anthranilic acid from glucose +  $\text{NH}_4\text{Cl}$  only with the addition of serine to the medium. Mutant 5, with a requirement for tryptophane or indole, formed an unidentified indole derivative. In the case of mutants 1, 3 and 5, serine had a stimulatory effect upon synthesis from the glucose +  $\text{NH}_4\text{Cl}$ .

- 2760 RIZKI, M. T. M.  
**The nature of the pigment induced by chromogenic inductions of *Serratia marcescens*.**

Proc. nat. Acad. Sci. USA 1954 : 40 : 1135-38.

In a previous paper it was reported that some

colour variants of *S. marcescens* release chromogenic inducers with which other variants can react to produce pigment when grown in the same medium (cf. Abst. 1607). The petroleum ether extracts from the normal HY strain and four mutants,  $W_1$ ,  $O_3$ ,  $P_2$  and  $P_{18}$ , have been characterized on the basis of their absorption spectra. None of the absorption curves of the mutants resembled the curve of the pigment extract of HY. The absorption peaks at  $538 \mu$  and  $370 \mu$  for HY were however also found in the case of extracts of the red pigment induced by growing  $P_2$  with  $W_1$  and  $P_{18}$  with  $O_3$ .

- 2761 TESSI, J. L.

Estudio comparativo de dos bacterias patógenos en avena y determinación de una toxina que origina sus diferencias. (Comparative study of two bacteria pathogenic on oats and determination of a toxin which is responsible for their differences).

Rev. Invest. agríc. B. Aires 1953 : 7 : 131-45.

No morphological differences could be detected between *Pseudomonas striafaciens* and *Ps. coronafaciens*, nor differences in cultural and serological characteristics. All oat varieties so far tested showed the same varietal reaction to both species; the host range of *Ps. striafaciens* was however confined almost exclusively to oat varieties, whereas *Ps. coronafaciens*, when cultured in potato broth and certain other media with the addition of glucose, produced lesions on a number of other graminaceous plants. It was demonstrated that these were caused by a toxin produced by the latter species in these media; the same toxin is responsible for the typical symptoms of *Ps. coronafaciens* in natural infections, and cultures in which the power to produce toxin had been destroyed produced symptoms similar to those of *Ps. striafaciens*. The capacity to produce toxin seems to be the only feature in which the species differ and the validity of the specific difference is questioned.

**(Inequality of bacterial cells arising by division).**

Čeh. Biol. (Czech. Biol.) 1954 : 3 : 140-54. [Russian].

- 2762 Málek, I. I. (New evidence of the inequality of cells arising by division). (pp. 140-45).

Data on the disparity of cells that arise by division in *Escherichia coli* and *Bacillus pumilus* are presented.

- 2763 VOSYKOVÁ, L. (*Inequality of Escherichia coli cells arising by division in presence of a low concentration of penicillin*). (pp. 145-47).

Cells formed by fission required different periods to divide anew.

- 2764 WOLF, A. (*Evidence of cells dying in growing cultures*). (pp. 147-51).

Observations on *E. coli*, *B. pumilus* and *B. subtilis* have shown that one cell died in a culture within the first 2-3 divisions. The dead cells are regarded as mother cells, exhausted by previous divisions.

- 2765 FIALA, J. (*Using phase-contrast microcinema photography for the study of cell division in bacteria*). (pp. 151-54).

Equipment and methods for accurate recording of cell growth and division are described.

- 2766 DeLAMATER, E. D., HUNTER, M. E., SZYBALSKI, W. & BRYSON, V.

**Chemically induced aberrations of mitosis in bacteria.**

J. gen. Microbiol. 1955 : 12 : 203-12.

Investigations were carried out on the cytological effects of exposing *Bacillus megaterium* to various toxic agents, known to inhibit mitosis in higher organisms. An increase in the size and optical density of the stained nuclei and a preponderance of configurations resembling metaphase and anaphase stages resulted from treatment with most of the antibiotics and also with sodium p-aminosalicylate, applied at inhibitory concentrations. With further treatment, transient polyploidy was induced. Isoniazid and benzimidazole caused a decrease in the amount of stainable material in the nucleus, and with penicillin and bacitracin no nuclear changes could be detected. These results are considered to provide support for the view that the nuclei of bacteria and higher organisms are similar.

- 2767 HUGHES, W. H.

**The inheritance of differences in growth rate in *Escherichia coli*.**

J. gen. Microbiol. 1955 : 12 : 265-68.

Individual colonies obtained by culturing single cells under anaerobic conditions exhibited differences in growth rate as measured by diameter after a short period of incubation. When small and large colonies were selected, the populations derived from them inherited the tendency to form colonies correspondingly smaller or larger than the mean of those produced by the parent strain, provided that no other selective conditions were applied.

- 2768 LEDERBERG, J.

**Phase variation in *Salmonella*.**

Genetics 1954 : 39 : p. 978. (Abst.).

The flagella carried by cells of a given serotype are characterized by alternative antigenic phases which are genetically conservative; the alteration may occur at a rate of  $10^{-4}$  per generation or at a much lower rate, and superficially resembles point mutation. Experiments on genetic transduction have suggested that the alternative specificities are controlled by two distinct loci,  $H_1$  and  $H_2$ , corresponding to the two homologous series of antigens involved. The correlation between the antigenic state of the donor cells and the transductive competence of phage lysates from them suggests that the differentiation of the two phases depends upon the states of the  $H_1$  and  $H_2$  loci themselves and not on the cytoplasm or a third locus. In addition, other antigenic variations, viz. the so-called artificial phases, behave not as phasic oscillations but as point mutations affecting serological specificity, e.g. the change from  $H_1^b$  to  $H_1^{*33}$ .

- 2769 MORSE, M. L.

**Transduction of certain loci in *Escherichia coli* K-12.**

Genetics 1954 : 39 : 984-85. (Abst.).

As reported by Lederberg and Lederberg (cf. *PBA*, Vol. XXIII, Abst. 1720), lysogenicity for the phage  $\lambda$  is determined by a nuclear gene closely linked to a set of loci affecting galactose fermentation. A small fraction of the cells in galactose — cultures can be transformed to fermenters by  $\lambda$  lysates from galactose + cells or from nonhomologous — cells. The interactions between cells and lysates are concordant with the results of tests of allelism by crossing. With an excess of assay cells, the number of transformations is proportional to the amount of lysate added, with an efficiency of approximately one transduction per million plaque-forming particles. Most transformed clones are unstable for galactose fermentation and continue to segregate galactose — cells after repeated isolation of single colonies. When  $Gal_1^-$  cells are transformed with wild-type lysates the negative segregates from the "heterozygous" positives are  $Gal_1^-$ ; when  $Gal_1^-$  are transformed with a lysate of  $Gal_2^-$  cells, the negative segregates are usually  $Gal_1^-$ , occasionally  $Gal_2^-$  and rarely  $Gal_1^- Gal_2^-$ . Exceptional lysates are capable of transforming a large proportion of a cell population and of transducing  $Gal^-$  as well as  $Gal^+$  alleles. As in *Salmonella* the phage studied behaved as a passive vector of genetic material. Other loci



tested, not linked with *Gal* loci, were not transduced by  $\lambda$ .

2770 LEDERBERG, E. M.

**The inheritance of lysogenicity in interstrain crosses of *Escherichia coli*.**

Genetics 1954 : 39 : p. 978. (Abst.).

Of 50 strains tested, four proved to be sensitive to and lysogenized by the phage  $\lambda$  carried by strain K12. Data from crosses revealed the presence of a locus (*Lp*) for lysogenicity, linked with *Gal*. Whenever lysogenic  $\times$  sensitive crosses involved K12 as one parent, two lysogenic and two sensitive recombinant phenotypes were found in the progeny, indicating the presence of a second locus (*Mp*), modifying the expression of *Lp*. K12 is represented by the genotypes *Mp<sup>r</sup>Lp<sup>+</sup>* (lysogenic) and *Mp<sup>r</sup>Lp<sup>s</sup>* (sensitive); the above-mentioned four strains occur as *Mp<sup>s</sup>Lp<sup>+</sup>* (modified lysogenic) and *Mp<sup>s</sup>Lp<sup>s</sup>* (modified sensitive). Linkage of *Mp* to the *Gal* and *Lp* loci was not demonstrated. Crosses reciprocal for the compatibility factor *F* differed with respect to the number but not the type of recombinants obtained. The absence of sensitives from crosses of lysogenics segregating for *Mp* makes it likely that  $\lambda$  prophage remains attached to *Lp* rather than to *Mp*.

2771 DE HAAN, P. G.

**Genetic recombination in *Escherichia coli* B. III. The influence of experimental conditions on the transfer of unselected markers.**

Genetica 1955 : 27 : 364-76.

In crosses between mutant strains of *E. coli* B, changes in the cultural medium on which the parents were grown had a marked effect on the percentage of transfer, from the *F<sup>+</sup>* parent to the progeny, of certain loci controlling phage resistance. The effect, which appeared to operate through the *F<sup>-</sup>* parent, could be annulled by the introduction of a second phage resistance locus into either parent. In crosses involving other phage resistance loci and auxotrophic markers, the transfer percentages were independent of the cultural conditions. The addition of methionine to the medium has a distinct effect on the transfer percentages of several loci, a fact which should be taken into consideration in attempting to estimate the degree of linkage of such loci with the locus for methionine utilization (cf. Abst. 723).

2772 HOHRJAKOV, M. K.

**(The species of fungi).**

Bot. Ž. (Bot. J.), Moskva 1955 : 40 : No. 1 : 33-45. [Russian].

The concept of the species in the fungi is

discussed and reference is made to the relevance of Lysenko's views on competition and hybridization between and within species.

2773 IMŠENECKIĬ, A. A.

**(Selecting cultures of fungi for the fermenting industry).**

Vestn. Akad. Nauk SSSR (Rec. Acad. Sci. USSR) 1955: No. 1: 46-48. [Russian].

At the Institute of Microbiology, smooth strains of *Aspergillus nidulans*, *A. repens* and *A. glaucus* that break down proteins more actively than an industrial culture of *A. oryzae* have been selected from strains maintained in culture. The smooth variants were then irradiated with ultraviolet light, thereby inducing mutations. Finally rough forms with improved proteolytic properties have been selected among the mutants.

2774 ROPER, J. A. & PRITCHARD, R. H.

**Recovery of the complementary products of mitotic crossing-over.**

Nature, Lond. 1953 : 175 : p. 639.

Analysis of mitotic crossing-over in *Aspergillus nidulans* (cf. PBA, Vol. XXIV, Abst. 1664) has given results consistent with Stern's interpretation of the phenomenon in *Drosophila*, viz. that mitotic crossing-over occurs in such a manner that only two of the four strands recombine at any one point, segregation of the centromeres being of the mitotic type. Further support for this interpretation has been obtained by the recovery, within a single diploid nucleus of *Aspergillus*, of the reciprocal products of mitotic crossing-over. The technique used was based on the recombination of two mutant alleles for adenine requirement, *ad<sub>16</sub>* and *ad<sub>8</sub>*, which originated independently and show a position effect.

2775 SNEATH, P. H. A.

**Putrescine as an essential growth factor for a mutant of *Aspergillus nidulans*.**

Nature, Lond. 1955 : 175 : p. 818.

A mutant induced by treatment with ultraviolet rays showed a requirement for putrescine which was dependent upon a single gene.

2776 JAMES, A. P.

**Evidence of irradiation induced somatic crossing over in diploid yeast.**

Genetics 1954 : 39 : p. 974. (Abst.).

The gene pairs at three different loci, *G<sub>1</sub>*, *G<sub>2</sub>* and *G<sub>3</sub>*, each concerned with galactose utilization, are being used to study a class of variants occurring with a high frequency in diploid yeast after treatment with ultraviolet light. The dominant phenotype is characterized by black

galactose + colonies and by recessive white — colonies on galactose - EMB indicator medium; the absence of a dominant allele at any of the three loci results in the recessive phenotype. When + cells heterozygous at one or more of the loci are irradiated and grown on indicator medium, variant colonies, either wholly negative or sectored, were obtained. With a dose of 200 ergs per mm.<sup>2</sup>, the variants occurred with frequencies of 3.6, 1.7 and 1.0% in the genotypes  $G_3g_3$ ,  $G_{1g_1}$  and  $G_2g_2$  respectively, other loci being in the dominant homozygous condition. The following observations suggest that the variants are probably due to somatic crossing-over: (1) in the sectored variants,  $GG$  + sectors tend to occur together with galactose  $gg$  — sectors; (2) variant colonies only occur rarely when irradiated + haploid cells are plated; and (3) the locus most frequently affected,  $G_3$ , is furthest removed from the centromere.

2777 HOWE, H. B. (Jun.).

**Crossing-over in the first (sex) chromosome of *Neurospora crassa*.**

Genetics 1954 : 39 : 972-73. (Abst.).

Investigations were carried out on the following three regions: I, *sex* — *ad-5*, 4.6 units; II, *ad-5* — centromere, 2.5 units; and III, centromere — *vis*, 6.1 units. Region IV (*rib-1* — centromere, 1.4 units) on chromosome 6 was used to detect nuclear transposition, e.g. slippage or spindle overlap. In tetrad analysis of the cross *ad-5*, *vis*, *rib-1* x wild type, the numbers of no cross-overs and single cross-overs obtained agreed with the calculated values. Of the 19 double cross-overs detected, 6, 9 and 4 involved 2, 3 and 4 strands respectively. No triple cross-overs occurred. Although 5 of the 6 asci providing evidence of two-strand double cross-overs involved regions II and III directly across the centromere, 4 of these asci also showed apparent postreduction of *rib-1* and therefore almost certainly resulted from transposition. A corrected ratio of 2 : 9 : 4 was obtained for the double cross-overs. Nuclear transposition may partly account for the excess of 2-strand double cross-overs across the centromere reported by Lindegren.

2778 DOUDNEY, C. O.

**Gene interaction and temperature response of the threonine inhibited strain of *Neurospora*.**

Genetics 1954 : 39 : p. 965. (Abst.).

Investigations on the reversal of threonine inhibition of strain UT77a of *N. crassa* indicated that threonine inhibits growth by interfering competitively with homocysteine metabolism,

thereby interrupting synthesis of methionine and, at higher concentrations, adenine and serine. Investigations were carried out on double mutants possessing the gene for threonine inhibition and the gene for threonine requirement. One such strain showed growth responses to threonine equivalent to those of the parent threonine-requiring strain, at threonine concentrations causing complete inhibition of growth of UT77a; another strain was even more markedly inhibited by threonine than UT77a. At lower temperatures UT77a required either the thiazole moiety of thiamin, or both homocysteine and threonine; the double amino-acid requirement was due to a competitive antagonism between threonine and homocysteine, the presence of either in the medium producing a requirement for the other; the thiazole requirement probably resulted from an interference of endogenously formed threonine with homocysteine metabolism. The phenomenon of growth inhibition by competitive processes at the metabolic level may be one basis of temperature-sensitive genetic blocks.

2779 ATWOOD, K. C., MUKAI, F. & PITTINGER, T.

***Neurospora* techniques for large-scale studies of recessive lethal mutation.**

Genetics 1954 : 39 : p. 957. (Abst.).

Special techniques devised for improving the heterocaryon method of detecting recessive lethal mutations in *Neurospora* are briefly referred to (cf. Abst. 737).

2780 STRAUSS, B. S.

**Studies on the metabolism of acetate by acetate-requiring mutants of *Neurospora crassa*.**

Arch. Biochem. Biophys. 1955 : 55 : 77-94; also Genetics 1954 : 39 : p. 997. (Abst.).

The *ac* variants require acetate for growth and accumulate pyruvic acid (cf. *PBA*, Vol. XXIV, Abst. 1668). Data on this kind of mutant, the wild type and succinate-requiring mutants suggest that *N. crassa* ordinarily uses the tricarboxylic acid cycle for acetate oxidation but that a dicarboxylic acid cycle becomes operative in the succinate-requiring mutants. Addition of acetate to cultures of acetate-requiring mutants inhibits the accumulation of pyruvate from glucose; it is suggested that this inhibition of precursor accumulation by the substance required for growth provides a mechanism by which direction of the metabolic pathways can be regulated.



2781 FUERST, R.

**Differences in free intracellular amino acids in *Neurospora*.**

Genetics 1954 : 39 : p. 968. (Abst.).

Qualitative and quantitative difference in free aminoacids were found to be associated with some mutant characteristics, although the differences were complex. In a number of mutants certain aminoacids were consistently absent. In addition, some apparent differences between the mutant and wild types disappeared in back crosses to the wild type, new aminoacids being produced.

2782 WAGNER, R. P.

**An apparent metabolic block induced in a *Neurospora* mutant by threonine.**

Genetics 1954 : 39 : p. 1000. (Abst.).

It has been previously reported that a mutant (T77) grows well on a minimal medium but is inhibited by threonine at 35° C. (cf. *PBA*, Vol. XXIII, Abst. 140). It has since been found that in the presence of threonine the slight mycelial growth formed in the first 72 hours of the mutant growth produced a large amount of  $\alpha$ -keto- $\beta$ -ethylbutyric acid, a compound known to be a metabolic derivative of threonine and a precursor of isoleucine. The wild type does not accumulate this keto acid in the presence of threonine, except for a brief period during the early phases of growth. Neither  $\alpha$ -keto- $\beta$ -ethylbutyric acid nor isoleucine are inhibitory to the growth of T77.

2783 RAGLAND, J. B.

**A strain of *Neurospora* inhibited by histidine.**

Genetics 1954 : 39 : p. 988. (Abst.).

Strain T-66, obtained by ultraviolet irradiation, is strongly inhibited by the addition of histidine to the medium. Data have been obtained suggesting that the mutation responsible for this behaviour has altered the metabolism in such a fashion that the presence of histidine upsets the nitrogen metabolism.

2784 WOODWARD, V. W.

**Mutation rates at one glutamic acid locus in *Neurospora crassa*.**

Genetics 1954 : 39 : 1001-02. (Abst.).

By means of the previously reported technique of filtration and selective plating (cf. *PBA*, Vol. XXIII, Abst. 938 and Vol. XXV, Abst. 734), the rates of direct mutation of the locus for glutamic acid utilization were determined. The numbers of mutants per  $10^4$  conidia recovered from untreated irradiated populations were as follows: untreated, 0.8; exposure to

4,560 r., 5; 12,540 r., 11; and 21,600 r., 18. The data indicated a linear dose-mutation relationship.

2785 WOODWARD, V. W. & CLARK, C. M.

**Genetic and nongenetic effects of radiations in *Neurospora*.**

Science 1955 : 121 : 641-42.

The frequency of mutation at the locus governing utilization of glutamic acid increased linearly with X-ray dosage. X-irradiation increased the number of germinating conidia. Treatment of the conidia with X or  $\gamma$  rays resulted in increased rate of growth; retardation in growth was however obtained with exposure to ultraviolet rays or thermal neutrons. Before the relationship between inactivation and mutation due to X irradiation can be elucidated, experimental separation of the two component events represented by a given survival curve, viz. killing due to nuclear damage and conidial activation, is necessary.

2786 HOLLOWAY, B. W.

**Genetic control of heterocaryosis in *Neurospora crassa*.**

Genetics 1955 : 40 : 117-29.

At least four genes were found to be concerned in the process of heterocaryon formation between a mutant requiring pantothenic acid and another requiring lysine. These genes controlled not only the actual formation of heterocaryons but also the type of heterocaryotic growth. The following characteristics were affected: (1) time lag in the initiation of growth, (2) ability to maintain growth and (3) growth rate and habit. Six types of heterocaryon could be distinguished. It is postulated that heterocaryons were produced only in the presence of *W* in combination with *X* or *Y*. Gene *X* also influenced the growth rate and general vigour of the heterocaryotic mycelium and *Y* was also responsible for the maintenance of the heterocaryon. The fourth gene, *Z*, enabled any heterocaryon formed to initiate growth soon after inoculation. The alternative alleles are designated *W'*, *X'*, *Y'*, and *Z'*; it is not known which alleles are dominant.

2787 GARNJOBST, L.

**Further analysis of genetic control of heterocaryosis in *Neurospora crassa*.**

Amer. J. Bot. 1955 : 42 : 444-48.

In continuation of the research summarized in *PBA*, Vol. XXIV, Abst. 876, the author reports that all nutritionally complementary pairs of cultures with the same heterocaryotic genes, i.e. *CD* + *CD*, *cD* + *cD*, *Cd* + *Cd* or *cd* + *cd*

form heterocaryons, but that all dissimilar combinations of heterocaryotic genes, i.e.  $CD + cD$ ,  $CD + Cd$ ,  $CD + cd$ ,  $cD + Cd$ ,  $cD + cd$  or  $Cd + cd$  normally result in failure of heterocaryon formation.

2788 PITTENGER, T. H. & ATWOOD, K. C.

**The relation of growth rate to nuclear ratio in *Neurospora* heterocaryons.**

Genetics 1954 : 39 : 987-88. (Abst.).

The relation between the nuclear ratio and growth rate in *N. crassa* varied according to the heterocaryon involved and the initial nuclear ratio. In most cases the nuclear ratio remained constant at the initial values throughout the length of the hypha and the growth rate remained unchanged over a wide range of nuclear ratios, but in some heterocaryons, regardless of the initial ratio, selection occurred for one of the nuclear types without apparent change in the growth rate. In other instances, the growth rates were equal but submaximal at several different nuclear ratios. In yet another case, the nuclear ratios of two strains mixed in several different proportions remained at the initial value during 10 days of growth without any selection affecting the nuclear ratios, although the growth rate at the most extreme ratio was less than half that of the same heterocaryon with other ratios. It therefore appears that in many heterocaryons no definite selection for nuclear ratios giving maximum growth rates is operative.

2789 DRIVER, C. H. & WHEELER, H. E.

**A sexual hormone in *Glomerella*.**

Mycologia 1955 : 47 : 311-16.

The results of experiments on the induction of selfing in almost self-sterile mutants ( $A^+B^2$ ) by filtrates from self-fertile wild-type cultures ( $A^+B^+$ ) suggest that a hormone is required for caryogamy. Mutant genes such as  $B^2$  probably cause blocks in the synthesis of the substances required for the completion of the sexual process (cf. *PBA*, Vol. XXII, Abst. 1680 and Vol. XXV, Abst. 84).

2790 RIZET, G. & ESSER, K.

Sur des phénomènes d'incompatibilité entre souches d'origines différentes chez *Podospora anserina*. (On some phenomena of incompatibility between strains of different origin in *P. anserina*).

CR Acad. Sci., Paris 1953 : 237 : 760-61.

When strain M of *P. anserina* was crossed with strain S, only strain S developed spores. Of the resulting  $F_1$  progeny some proved fully fertile when intercrossed, some were semiincompatible

and some were completely sterile. At least 3 pairs of genes,  $tt_1$ ,  $uu_1$  and  $vv_1$ , may cause semiincompatibility. The gene pair  $vv_1$  also plays a role in the formation of the neutral zone that is always present when semiincompatibility occurs.

2791 ESSER, K.

Sur le déterminisme génétique d'un nouveau type d'incompatibilité chez *Podospora*. (On the genetical determination of a new type of incompatibility in *Podospora*).

CR Acad. Sci., Paris 1954 : 238 : 1731-33.

The results of previous studies on semiincompatibility in crosses between strain M and strain S of *P. anserina* are reviewed (cf. Abst. 2790). In the hybrid progeny, semiincompatibility may result from the combined action of the gene pairs  $aa_1$  and  $bb_1$  or from the action of the gene pairs  $vv_1$  and  $cc_1$ . When a hybrid with the genetic constitution  $a_1b_1$  is crossed with a hybrid with the constitution  $ab$ , only  $ab$  develops spores, the cross thus achieved being realizable only in the direction  $ab \text{ ♀} \times a_1b_1 \text{ ♂}$ . Similarly, when a hybrid containing  $v$  is crossed with a hybrid containing  $v_1c_1$ , spores are formed only in the hybrid containing  $v$  and the cross is fertile only in the direction  $v \text{ ♀} \times v_1c_1 \text{ ♂}$ . The combinations  $v_1abc_1$  and  $va_1b_1c$  are lethal.

2792 ESSER, K.

Genetische Untersuchungen an *Podospora anserina* (Ces.) Rehm. [Genetical investigations on *P. anserina* (Ces.) Rehm.].

Ber. dtsh. bot. Ges. 1955 : 68 : No. 3 : 143-44.

Lines of *P. anserina* with the constitution  $ab$  crossed with lines with the constitution  $a_1b_1$  (cf. Abst. 2791) gave rise to an  $F_1$  consisting of  $ab$ ,  $a_1b_1$ ,  $ab_1$  and  $a_1b$  progeny. Spores of the constitution  $ab$ ,  $a_1b_1$  and  $ab_1$  germinated well and grew normally but growth was impeded in the case of  $a_1b$ . Mutations of  $a_1$  to  $a$  were observed in hybrids with the constitution  $a_1b$ . The mutation from  $a_1$  to  $a$  was found to occur only in the presence of  $b$ , which itself never mutated. It is concluded that  $a_1$  and  $b$  are incompatible,  $b$  being responsible for the mutation of  $a_1$  to  $a$ .

2793 DODGE, B. O.

**Phenocopies in *Neurospora*.**

J. Hered. 1955 : 46 : 3-8.

The author presents an account of investigations carried out since 1926 by himself and his colleagues on phenocopies of an indurated type



of sporeless ascus in *N. tetrasperma*, which is dependent upon a so-called dominant lethal, *I*. Phenocopies with the genotypes *Aaiidd* and *AaiDd* have been identified which correspond to *Aaiidd* and *AaiDd* asci respectively, *A* and *a* being genes for mating type, and *d* a recessive for deliquescent ascus abortion. The phenocopy was therefore produced irrespectively of whether the ascus is heterozygous or homozygous for *d*. The nonheritable agent for the indurated ascus wall tended to prevent the degeneration of the nuclei in asci homozygous for *dd* and then to stimulate nuclear division so that "germination" of the ascus was obtained in some cases. Whether the indurated type of abortion is of the heritable or nonheritable type, failure to form spores may possibly be due to the occurrence of the fourth division before the spore formation as the result of stimulus by *I*. Spore arrangements in *Neurospora* spp. are discussed in relation to the occurrence of segregation and the possible significance of phenocopies in elucidating the evolution of this genus is pointed out.

2794 MARKERT, C. L. & OWEN, R. D.  
**Immunogenetic studies of tyrosinase specificity.**

Genetics 1954 : 39 : 818-35.

The tyrosinase activity of extracts of the *Glomerella* mycelium depends upon the genotype and upon the environmental conditions under which the mycelium is grown (cf. *PBA*, Vol. XX, Abst. 1470 and Vol. XXIV, Abst. 108). Genetic or environmentally induced changes in tyrosinase activity are related to changes in the number of tyrosinase molecules synthesized by the mycelium rather than to changes in the nature of the tyrosinase molecule. The enzymatically active surface and the antigenically active surface of the tyrosinase molecule appear to be at least partly identical in position. The antigenic surfaces of tyrosinase molecules are specific for a given organism since no cross reactions were found between antibodies to *Glomerella* tyrosinase and tyrosinase from *Psalliota*, *Solanum*, *Neurospora* and *Tenebrio*. Antisera containing antibodies to *Glomerella* tyrosinase were not mutagenic when applied to *Glomerella* conidia.

2795 MAGNI, G. E.  
**Genetical and biophysical methods of research for studies on the systematics of fungi.**

Atti Ist. bot. Univ. Pavia 1954 : Ser. 5 : 10 : 201-10.

After discussing the possible value of hybrid

sterility as a basis of classification of the sporogenous yeasts, as suggested by the work of Winge and Laustsen, the author gives an account of his own investigations on asporogenous yeasts with respect to (1) differential response to X-ray inactivation as a means of classifying strains into haploids, diploids or polyploids (cf. *PBA*, Vol. XXIV, Abst. 114) and (2) spontaneous and induced mutability as an aid in evaluating the taxonomic significance of characters (cf. *PBA*, Vol. XXIV, Abst. 112).

2796 RAUT, C.

**The effect of ultraviolet light of various wavelengths on the production of cytochrome-deficient yeast.**

Genetics 1954 : 39 : p. 989. (Abst.).

Normal and cytochrome-deficient haploid strains were irradiated at various wave lengths of ultraviolet light. Both strains were killed at comparable rates, with the maximum rate at 2600 Å. A large proportion of the survivors of the irradiated normal cells produced cytochrome-deficient petite colonies, this deficiency being cytoplasmically determined, and it is suggested that absorption of ultraviolet light by nucleic acid is involved in the destruction or inactivation of the cytoplasmic particles necessary for the production of the complete cytochrome system and that possibly the particles themselves contain nucleic acid.

2797 LINDEGREN, C. C.

**Non-Mendelian segregation in a single tetrad of *Saccharomyces* ascribed to gene conversion.**

Science 1955 : 121 : 605-07.

A diploid zygote which was heterozygous for the genes for pink and white coloration and for a number of markers segregated into three recessive pink cultures and one dominant white; this irregular segregation is ascribed to gene conversion (cf. *PBA*, Vol. XXIII, Abst. 2429). The haploid nature of the four cultures derived from the irregular zygote was confirmed by the regular segregation of the marker genes in outcrosses and by data on X-ray survival and nitrogen per cell.

2798 JAMES, A. P.

**A genetic analysis of sectoring in ultraviolet-induced variant colonies of yeast.**

Genetics 1955 : 40 : 204-13.

Experiments on a galactose + strain of *Saccharomyces cerevisiae* have provided evidence suggesting that ultraviolet irradiation of vegetative diploid cells induces genetic reassortment. Using a dose of 200 ergs./mm.<sup>2</sup>, a high frequency

of colonies with + and - sectors for response to galactose was obtained. Data on the distribution of induced lethal mutants in the sectored colonies were derived from single irradiated nuclei. The parental cells were heterozygous for a single gene pair (*Gg*) controlling galactose utilization, variant - cells having the constitution *gg*. Irradiation of heterozygotes led to homozygosity of dominant genes as well as of recessive genes, the occurrence of homozygous dominants and homozygous recessive genotypes being correlated. Further evidence in support of the hypothesis of reassortment was provided by the fact that the frequencies of - variants induced in + haploids and of + variants obtained by treatment of *gg* diploids were low.

2799 OGUR, M.

**The rapid estimation of ploidy in cultures of *Saccharomyces*.**

J. Bact. 1955 : 69 : 159-62.

Data are presented to illustrate the relationship between chromosome number on the one hand and total nitrogen content and degree of turbidity on the other in *Saccharomyces* spp. It is claimed that the method described offers a reliable and rapid means of establishing whether a given strain is haploid, diploid, triploid or tetraploid.

2800 WIDRA, A. & DELAMATER, E. D.

**The cytology of meiosis in *Schizosaccharomyces octosporus*.**

Amer. J. Bot. 1955 : 42 : 423-35.

A photographic record of sexual fusion, ascospore formation and meiosis is presented. It is concluded that (1) there are  $n = 4$  chromosomes; (2) the nucleus and vacuole are different entities; and (3) there is a clearly distinguishable centriole.

2801 FAVRET, E. A.

Consideraciones genéticas sobre la aparición de formas resistentes en microorganismos sensibles a la fungocina. (Genetical considerations concerning the appearance of resistant forms in microorganisms susceptible to fungocine).

Arch. Med. internac. Antibiot. QuimTer. 1952 : 2 : No. 7 : unpaginated.

The effects of various concentrations of the antibiotic fungocine on cultures of *Neurospora crassa* were shown to be similar to those of a culture of *Bacillus subtilis*, the organism from which fungocine is derived. Attempts to induce mycelial cultures to adapt themselves to increasing doses of the antibiotic were not successful. In *Candida nodosa* however certain monoclonal lines isolated from cultures

containing high concentrations of fungocine possessed complete resistance to the antibiotic and retained their resistance after several passages through normal media; other lines displaying varying degrees of resistance were isolated. The resistant lines gave rough colonies more frequently than the normal but some were perfectly smooth. No metabolic deficiency was noted in any of the resistant lines.

In similar experiments with *Schizosaccharomyces pombe* some lines showing a high degree of resistance were produced but their resistance was less stable in subsequent generations. Stable resistant strains were produced in *Staphylococcus aureus*. When sodium oleate, which has detergent properties similar to those exhibited by fungocine, was used in place of the antibiotic no resistant lines were produced.

No mutagenic activity of fungocine could be demonstrated in experiments with *N. crassa* lines deficient in ability to synthesize arginine and tryptophane respectively.

The percentage of fungocine-resistant colonies was increased greatly in *C. monosa* by ultraviolet irradiation.

2802 PAPAZIAN, H. P.

**Sectoring variants in *Schizophyllum*.**

Amer. J. Bot. 1955 : 42 : 394-400.

The streak type (str) of *S. commune* depends upon a single gene (*s*). In the progeny of the cross between the double mutant *sd<sup>4</sup>* and the wild type, *d<sup>4</sup>* being a single gene mutation for dwarf growth, most of the expected str class appeared as a dwarf type str' which sectored irreversibly into str. In the progeny of the triple mutant *sd<sup>4</sup>d<sup>6</sup>* x wild type, *d<sup>6</sup>* being another single-gene mutation for dwarf growth, no str' mycelia were produced. The rate of change of str' to str was not affected by change in the medium, treatment with mutagenic agents, mixing str' and str mycelia in a Waring blender, age of inoculum, or selection of str' for high and low rates of sectoring. The rate of change was however considerably increased with a change of temperature from 19° to 31° C. or in heterocaryons in which str' nuclei were present with str nuclei in str cytoplasm. The change from str' to str is more satisfactorily explained in terms of the presence or absence of cytoplasmic particles than by postulating genic mutation.

2803 TAKEMARU, T.

**Genetics of *Collybia velutipes*, II. Dedikaryotization and its genetical implication.**

Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 1-7.

H. J. Brodie's report of dedicaryotized oidia in



*C. velutipes* is confirmed. A schedule of back crosses whereby the nucleus of one monocaryotic strain can be transferred to the cytoplasm of another is presented.

2804 LURIA, S. E.

**The T2 mystery.**

Sci. Amer. 1955 : 192 : No. 4 : 92-94.

An account is given of recent investigations on host-induced modifications of phage T2 and other bacteriophages. Such a modification, causing inability to grow in a certain host, is ascribed to a change in the viral nucleic acid which results in a failure of this material to establish contact with the host nucleus so that neither prophage nor virus is produced. The view is expressed that recent findings, including those on host-induced modifications, further emphasize the similarity of viruses to hereditary units such as genes.

### CROP PLANTS

Huitième Congrès International de Botanique, Paris 1954. Rapports et communications parvenus avant le congrès aux sections 14, 15 et 16. (**Eighth International Botanical Congress, Paris 1954. Reports and communications presented to the Congress in sections 14, 15 and 16**). Pp. 131.

Section 14 of the above report deals with plants of economic importance and their classification, section 15 with ethnobotany and section 16 with bryology.

2805 van Os, F. H. L. *Le développement des recherches scientifiques dans la culture des plantes médicinales. (The development of scientific research on the cultivation of medicinal plants.* (pp. 1-10).

A brief note on improvements effected by selection and polyploidization is included.

2806 Froment, P. *Essais d'amélioration dans la culture du lin en Bretagne. (Attempts at improvement in the cultivation of flax in Brittany).* (pp. 14-15).

It is recommended that the local varieties Côtes-du-Nord [Northern Shores] and Finistère be replaced by new productive Dutch varieties such as Wiera and that measures be undertaken to improve soil fertility.

2807 Hawkes, J. G. *The ecology of wild potato species and its bearing on the origin of potato cultivation.* (pp. 49-50).

The author suggests that Vavilov's theory that

the wild plants most closely related morphologically to cultivated species form one ecological group with them is applicable to a study of the origin of the cultivated potato. The more edible wild species would have first appeared as weeds in clearings made by primitive man and subsequently brought into cultivation (cf. Abst. 3189).

2808 **Varietal research on new varieties of cereals, leguminous plants and flax.**

Windmill, The Hague 1955 : No. 16 : 3-4.

(Also in French, 1-3; German, p. 4; Spanish, p. 5; and Italian, 5-6).

A brief account of the procedure followed in the Netherlands in testing new varieties of the above crop plants is presented.

**Forty-fifth Annual Report of the John Innes Horticultural Institution for 1954 (1955) : Pp. 35.**

2809 Brown, A. G. *Department of Plant Breeding.* (pp. 6-11).

**Pear.** Of the 180 seedlings of Beurré Giffard x Conference studied, 17.2% showed little or no infection due to *Venturia pirina*.

A 2n-4n chimera of Fertility, behaving as a tetraploid, is much more susceptible to frost injury to the blossoms than normal 2n Fertility but is capable of producing a fairly good crop of large parthenocarpic fruits.

**Apple.** Several seedlings have remained free from mildew (*Podosphaera leucotricha*).

**Prunus spp.** Mean stamen number in cultivated plum varieties ranges from 15 to 33 per flower. As in cherries, each variety has a characteristic stamen pattern. Genuine bud sports have the same stamen pattern as the original parent. According to this observation Purple Pershore is not a bud sport of Pershore, as commonly supposed. Stamen numbers in cultivated hexaploid varieties of *P. domestica* are in agreement with the supposed origin of this species from *P. spinosa* and *P. divaricata*. The new variety of cherry, Mertón Late, belongs to incompatibility group IX. So far six S alleles for incompatibility have been found in *P. avium*.

**Strawberry.** Seedlings from crosses were selected. A survey of the breeding material for new sources of resistance to red core has been initiated.

The results of selfing Blakemore, a variety susceptible to June yellows, a condition believed to be under plasmagenic control, indicated that (1) the percentages of affected seedlings from yellowed plants were related to the severity of

symptoms shown by the parents, (2) green plants gave a lower percentage of affected seedlings than yellow and (3) green plants differed in the percentage of affected plants in their progeny.

**Rubus.** Biometrical characters in the raspberry were further studied. Wild British raspberry strains have been collected from various parts to study their genetic variation and possible value in breeding. The association between glandular seedlings and the thornless condition in adult plants is useful in blackberry selection.

**Sweet corn.** Data from  $F_1$  single crosses indicated that considerable heterosis is obtained when the parental inbreds are flint derivatives.

2810 Lewis, D. *Department of Genetics.* (pp. 12-17).

**Tomato.** Stocks with different genes for disease resistance are being developed so that when new races arise appropriate changes can be made in the parent strains of  $F_1$  hybrids. Three different genes for resistance to *Cladosporium fulvum* are being introduced, singly or in pairs, into parent stocks. To facilitate the production of  $F_1$  seed, the recessive character of nonshedding of pollen has been introduced into several stocks. In some lines selection has also been made for a long style, projecting beyond the anther cone, so that pollination is facilitated, but this character is mainly dominant; selection for low expression in the  $F_1$  may shift the dominance of the controlling genes. Seedling marker genes for hypocotyl colour and leaf shape have also been transferred to parent stocks for the purpose of checking seed purity. Two  $F_1$  hybrids showing particular promise compared with Potentate are to undergo further trial.

In the  $F_1$  hybrid of cultivated tomato ♀ x *Lycopersicon pimpinellifolium* ♂ hybrid vigour is expressed as an ability to flower and set fruit in winter; the reciprocal does not exhibit this capacity. The gene-cytoplasm interaction causing this hybrid vigour has now been largely fixed in back crosses to *L. esculentum*; lines with the winter-fruited habit will be used in  $F_1$  hybrid production.

Experiments on the problem of whether genes controlling pollen-tube growth are linked with genes controlling quantitative characters of the plant have indicated that when pollen competition is present the grains carrying genes for an extreme phenotype are eliminated. This problem is also being studied in *Melandrium* and *Salpiglossis*.

**Oenothera.** Data from *Oe. trichocalyx* x *Oe.*

*pallida* provided evidence of interaction between the cytoplasm and S complex in the production of a substance necessary for pollen-tube growth and as a vehicle for the incompatibility antigens.

**Coprinus.** *C. lagopus* is especially suitable for the study of nucleus-cytoplasm relationships since reciprocal crosses each having the same pair of nuclei but different cytoplasm can be made. A reciprocal difference in respiratory enzymes has been detected.

**Cladosporium.** A mutation from race 0 to race 2 of *C. fulvum* was induced by X irradiation. Mixtures of two races applied to a resistant host failed to produce heterocaryons; a genetic explanation based upon a comparison of a typical fungus-host relationship with the incompatibility relationship between pollen and style is suggested to explain this negative result.

2811 La Cour, L. F. *Department of Cytology.* (pp. 18-23).

**DNA content.** Low-temperature treatment resulted in a reduction in deoxyribose nucleic acid content in interphase nuclei of meristematic cells in *Vicia faba* and species of other genera.

**Chromatin.** Using *Fritillaria* and *Trillium*, differences in chemical composition between euchromatin and heterochromatin are being analysed. When root-tips are stained with aniline blue and orange G, the chromosomes are yellow from late prophase to the end of anaphase; at telophase, interphase and a major part of prophase, euchromatin stains blue and heterochromatin yellow; the nucleoli are yellow. The yellow coloration is probably due to the presence of a protein-phospholipid complex which becomes attached to the chromosomes at prophase.

**Chiasma formation.** Both infrared radiation and high temperature influence chromosome movement so that pachytene pairing is more complete at interstitial regions than is usual.

**Radiation sensitivity.** Data from experiments in *Vicia faba* have shown that the presence of extranucleolar organizers may reduce the frequency of induced breakage, probably as the result of rapid restitution.

**B chromosomes.** B chromosomes in *Ranunculus ficaria* were further studied.

**Nucleoli.** In *Narcissus bulbocodium*, but not in *R. ficaria*, the addition of extra heterochromatin by B chromosomes causes increases in the size of nucleoli.

Nucleolar behaviour was investigated in *Tradescantia bracteata* and *Phaedranassa carmioli*.

**Chromosome coiling.** After 24 hours at



41° C., major coils are absent at metaphase I and the bivalents are abnormally long in *T. bracteata*; the chromosomes are however shorter at early than at late metaphase I. At diplotene major coils may or may not occur; when such coils are present in only one half of a bivalent, both halves have the same length.

**Spontaneous aberrations.** A clone of *T. virginiana* shows relaxed spiralization and severe chromosome breakage, these two spontaneous abnormalities being unrelated.

**Maleic hydrazide.** Foliar spraying of King Edward potatoes with this chemical before harvest to prolong tuber dormancy resulted in a low frequency of chromosome breaks, observed in the sprouts.

Jahrbuch 1951 der Bundesanstalt für Pflanzenbau und Samenprüfung in Wien. (1951 year book of the Federal Institute for Plant Cultivation and Seed Testing, Vienna).

Bodenkultur 1952 : 3. Sonderh. : Pp. 283.

In addition to the information summarized below, the results of variety trials of mangels, swedes and a large number of vegetables are given.

2812 Fuchs, H. *Tätigkeitsbericht der Qualitätsabteilung.* (Report on the work of the Quality Division). (pp. 72-84).

Tabulated data, including information on moisture, gluten and raw protein contents, are presented on the milling and baking properties of the principal wheat and rye varieties cultivated in Austria.

2813 Nietsch, H. *Botanische Beschreibung einiger Winterweizensorten.* (Botanical description of some winter wheat varieties). (pp. 85-93).

Comprehensive data in tabular form are provided on the morphological characteristics of seven of the principal varieties of winter wheat cultivated in Austria. Information on maturity and resistance to frost and lodging is also given.

2814 Drahorad, F. *Sortengebiete, die natürliche Voraussetzung der Ertragssteigerung und Qualitätserzeugung.* (Varietal zones, the natural prerequisite for increasing yield and producing for quality). (pp. 100-18).

Data on the optimal zones of cultivation of wheat, oats and winter rye in Austria are presented, together with an evaluation of the effect of rainfall, temperature and soil conditions upon each cereal. Recommendations are also

made as to the most suitable varieties for cultivation in the different regions of the country and mention is made of the value of land races in breeding new varieties adapted to a particular region.

2815 Drahorad, F. *Züchtungserfolge mit bodenständigen Maissorten.* (Breeding successes with indigenous maize varieties). (pp. 119-21).

In trials conducted at Admont, Laubach and other centres in Austria in 1951, Mönchhofer Paduaner and Maiskönig [Maize King], both of which are selections from Austrian land races, gave fodder yields comparable with those of the best American hybrids. It is intended to raise inbred lines of these varieties with a view to the production of hybrid seed.

2816 Pammer, F. *Ergebnisse mehrjähriger Sortenprüfung bei Getreide.* (The results of several years' varietal trials with cereals). (pp. 140-66).

The results of trials of wheat, oats, rye and barley at various centres throughout Austria in 1949-1951 are presented.

2817 Buchinger, A. *Maisversuche 1951.* (Maize trials 1951). (pp. 167-88).

Austrian varieties for forage, silage and grain were compared with American hybrids at a number of centres. The American hybrids were considerably superior under favourable soil and climatic conditions but did badly when rainfall was inadequate or soil and climatic conditions were unfavourable.

2818 Demel, J. *Kartoffelversuche.* (Potato trials). (pp. 189-203).

The results are presented of potato trials held in Austria in 1951. Frühbote [Early Messenger], Sieglinde and Bintje proved highly susceptible to degeneration through virus attack.

2819 Krickl, M. *Anbau und Züchtung der Kautschukpflanze "Taraxacum kok-saghyz Rodin."* (Cultivation and breeding of the rubber plant *T. kok-saghyz* Rodin). (pp. 252-65).

Criteria to be employed in breeding higher-yielding strains of kok saghyz are listed. They include selection for greater resistance to high temperatures and drought, a short, thick root without forking to facilitate harvesting, and a high rubber content of the sap. Rubber content proved highly variable in parent material tested in Austria and ranged up to 20% in certain plants. Attempts to acclimatize the plant in Austria have so far proved unsuccessful.

- 2820 Pammer, F. *Österreichische Sortenliste landwirtschaftlicher Kulturpflanzen. Getreide. (Austrian varietal list of agricultural crop plants. Cereals).* (pp. 266-77).

Brief descriptions of the morphological characteristics, soil requirements, maturity group, yield, quality of grain, resistance to lodging and optimal zones of cultivation are presented for the principal varieties of wheat, oats, rye and barley cultivated in Austria.

Jahrbuch 1952 der Bundesanstalt für Pflanzenbau und Samenprüfung in Wien. (1952 year book of the Federal Institute for Plant Cultivation and Seed Testing, Vienna).

Bodenkultur 1953 : 4. Sonderheft : Pp. 180.

- 2821 Fuchs, H. *Tätigkeitsbericht der chemischen und Qualitätsabteilung. (Report on the activity and work of the Chemical and Quality Division).* (pp. 17-27).

Information is presented on the milling and baking properties of the principal wheat and rye varieties cultivated in Austria (cf. Abst. 2812).

- 2822 Nietsch, H. *Botanische Beschreibung von Winterweizensorten. (Botanical description of winter wheat varieties).* (pp. 42-53).

Descriptions of eleven Austrian wheat varieties are given (cf. Abst. 2813).

- 2823 Zweifler, E. *Ernteergebnisse der Getreideversuche 1951/52. (Harvest results of the 1951-52 cereal trials).* (pp. 69-85).

Tabulated data are presented on the results of trials of wheat, oats, rye and barley conducted at a number of centres and on different types of soil in Austria.

- 2824 Demel, J. *Ergebnisse mehrjähriger Sortenprüfungen bei Kartoffeln (1948-1952). [The results of several years' variety trials of potatoes (1948-1952)].* (pp. 95-107).

Information on yield, origin, maturity group, starch content and resistance to virus diseases is presented for a number of varieties of Austrian, Dutch and German origin tested at Fuchsenbigl, Grabenegg and Lambach during the above period. Of the early varieties, a strain of Bintje from Lower Austria gave the highest yields. Agnes outyielded all other late-maturing varieties. \*Of varieties suitable for the industrial extraction of starch, Panther produced the most satisfactory results.

- 2825 Graf, A. *Eine Charakteristik der nach dem Kriege in Oesterreich angebauten Futterrübensorten. (A description of mangel varieties cultivated in Austria after the war).* (pp. 108-21).

It is recalled that, in the immediate postwar period, seed of a number of hitherto unknown mangel varieties was imported into Austria. In trials carried out at Fuchsenbigl, Grabenegg, Lambach and other centres to ascertain which varieties were best adapted to Austrian conditions, Rosa Beta and Corona gave the highest average root yields and Ovana and Dänische Weisse Rex [Danish White Rex] possessed the highest dry matter content per given weight of roots. Data on the morphological characteristics, yield of roots and dry matter per ha., percentage of dry matter and sugar per given weight of root and ease with which the roots may be lifted are presented for nine of the varieties tested.

- 2826 Pammer, F. *Ergebnisse von 2 Anbauversuchen mit Luzernesorten und -herkünften. (The results of 2 cultural trials of lucerne varieties and provenances).* (pp. 127-37).

Data are presented on the morphological characteristics, maturity, resistance to cold and drought and yield of green matter, dry matter and protein of nine varieties and strains of European, North American and South African provenance tested at Fuchsenbigl and Lambach in 1948-50. Du Puits and Socheville gave the most satisfactory results.

- 2827 Philipp, F. *Gartenbaureferat. (Horticultural report).* (pp. 138-55).

The results of trials of Austrian and foreign varieties of vegetables for inclusion in the Austrian Pedigree Book of Approved Varieties (cf. Abst. 1648) are reported and brief descriptions are given of varieties of cabbage, Brussels sprouts, lettuce, beetroot, carrot, peas, beans, gherkin, tomato, celery, onion, radish, spinach, kohl rabi, parsley and endive tested.

Résumés des communications de la délégation soviétique au VIIIe Congrès International de Botanique. (Summaries of reports of the Soviet delegation to the VIIIth International Botanical Congress).

Akad. Nauk SSSR., Moskva 1954 : Pp. 158. (Also in Russian).

- 2828 Baranov, P. A. *Acclimatation des plantes en U.R.S.S. (The acclimatization of plants in the USSR).* (pp. 10-12).

Progress achieved in the USSR in the adaptation



of species of economic importance to climatic conditions different from those of their place of origin is outlined, training along the lines advocated by Mičurin, shattering the inheritance of the plant, polyploidization and distant hybridization all being claimed to have given highly satisfactory results. The cultivation of tea in the Subcarpathian mountains and of grapes in the Moscow and Leningrad provinces are cited, *inter alia*, as instances of the contribution made to the Soviet economy by the extensive acclimatization programme undertaken by plant breeders in the USSR.

- 2829 *Glouchtchenko, I. E. [Glušchenko, I. E.]. La hétérogénéité génétique des organismes végétaux. (The genetical heterogeneity of plant organisms). (pp. 20-25).*

Experiments with potato and sugar beet are cited as instances of the heterogeneity of plant tissues resulting in the development of new forms from artificially-induced adventitious buds (cf. *PBA*, Vol. XXIV, Abst. 2138). Productive, virus-free strains were obtained from adventitious buds from the inner tissues of the potato variety Lichtblick by excising the eyes (cf. *PBA*, Vol. XVII, Abst. 743). A similar method applied to sugar beet varieties resulted in strains with an improved sugar content. It is emphasized that such changes in hereditary constitution are not chimerical nor are they due to the occurrence of somatic mutations, but arise solely as the result of the heterogenic nature of the plant in question. The conversion of winter wheat and rye varieties into spring varieties and changes in hereditary constitution by means of graft hybridization are instanced as further examples of the way in which the heterogenic constitution of plant species has resulted in the development of new forms.

- 2830 *Joukovski [Žukovski], P. M. Les ressources végétales du globe terrestre et leur emploi dans la sélection et la cultivation des plantes en U.R.S.S. (The plant resources of the earth and their utilization in plant breeding and cultivation in the USSR). (pp. 35-40).*

The work of the Institute of Plant Industry in introducing and testing plant material obtained from different parts of the world is reviewed; at the present time its collection contains plants from 66 countries. Intergeneric and interspecific hybridization, the use of pollen mixtures and the exploitation of heterosis are among the activities of the Institute that receive mention.

- 2831 *DORST, J. C.*

**Impressions on plant breeding and genetics in Russia.**

*Euphytica*, Wageningen 1955 : 4 : 45-52.

During a visit to the USSR in 1954 the author saw, *inter alia*, some of Cicin's drought-resistant spring wheats, cold-resistant winter wheats, salt-tolerant wheats, wheats with high protein content of high feeding value and perennial wheats, all developed from crosses between various *Agropyron* and wheat species. At a station near Moscow he saw plots where populations from spontaneous crossings between *Medicago sativa* and *M. falcata* from different sources were being grown with a view to obtaining material adapted to the region. The author considers that the success of this method of producing adapted populations depends largely on natural selection and heterosis.

At Kiev the author was shown a common round pea grafted on to broad bean; the seeds of the resulting plants and their progenies resembled marrowfats. Successful grafts of red beet on sugar beet were also seen.

In addition to describing his observations, the author discusses Mičurin's influence on Soviet plant breeding.

- 2832 *EVDOKIMOV, M. M.*

**(Introduction of new standard varieties).**

*Sad i Ogorod (Gdn. & Veg. Gdn.)* 1955 : No. 6 : 6-8. [Russian].

**Cabbage.** Lebzjinskaja is a midseason type that outyields Braunschweig 423 by a good margin and produces firm heads.

**Water melon.** Bykovskii 22 is distinguished by high yield and good transportability. In flavour it equals Melitopolj 142.

**Cucumber.** Azovka exceeds Galatovskii 414 in the yield of first fruits.

**Tomato.** Krasnyi Dar [Red Gift] surpasses in yield all existing standards and shows resistance to diseases. Birjučii Kut 67 is a large-fruited midseason type, resistant to drought and diseases. It produces 97 c. per ha. more than Break o' Day 1638. Gruntovyj Gribovskii 1180 [Outdoor Gribovo 1180] is adapted to outdoor cultivation in many northern districts. Several high-yielding varieties specially suitable for cultivation under glass are also mentioned.

- 2833 *Arbetsplan för Weibullsholms Växtförädlingsanstalt för år 1955. (Programme of work of the Weibullsholm Plant Breeding Station for the year 1955). Pp. 41.*

This plan of proposed research at the

Weibullsholm Plant Breeding Station, Sweden, during the present year contains information on variety trials of cereals, leguminous crops, oil plants and vegetables and gives a general outline of current breeding objectives at the station.

2834 ÅKERMAN, Å.

50 Jahre Pflanzenzüchtung. (50 years of plant breeding).

Landw. Forsch. 1955: 6. Sonderheft: 4-10.

This article is a verbatim report of the opening address at the annual meeting, held in Darmstadt in February 1955, of the Association of German Agricultural Research and Experiment Stations. The achievements of the Svalöf Plant Breeding Station, Sweden, over the past 50 years are reviewed and present objectives outlined. Emphasis is being placed on increasing disease resistance in cereals, combining high yield with winter hardiness and early maturity and breeding wheat varieties with improved baking properties.

2835 Årsberättelse för 1954 avgiven den 28 januari 1955. (Annual report for 1954, presented 28 January 1955).

K. LantbrAkad. Tidskr. 1955: 94: 14-36.

This report of the Royal Swedish Academy of Agriculture includes a short resumé of research carried out at Svalöf, Weibullsholm and other institutes on the hybridization, production of artificial polyploids and induction of mutation in wheat, rye, clover and other crops.

2836 Arbetsplan för Sveriges Utsädesförening för år 1955. (Plan of work for the Swedish Seed Association for the year 1955).

Sverig. Utsädesfören. Tidskr. 1955: 65: 3-73.

This article outlines the programme proposed for the Svalöf Plant Breeding Institute and its substations during the current season and includes information on variety trials to be held; breeding work to be undertaken with cereals, forage grasses, leguminous crops, fibre and oil plants, root crops, hops, soya bean and tobacco; experiments on the induction of mutations; experiments to obtain polyploid lines of clover; and genetical studies to be carried out in conjunction with the Institute of Genetics, Lund University.

2837 ÁRNI JÓNSSON.

Skýrslur tilraunastöðvanna 1947-1950. (Reports of the experimental stations, 1947-50).

Rit Landbúnaðardeildar 1951: A-Flokkur: No. 4: Pp. 124.

The activities of the experimental stations at

Akureyri, Reythólar, Sámsstaðir and Skriðuklaustur, Iceland, are reviewed and notes are given on varietal trials, in particular of potatoes.

2838 KLEMENZ KR. KRISTJÁNSSON

Skýrsla Tilraunastöðvarinnar á Sámsstöðum 1928-1950. (Report of the Experimental Station at Sámsstaðir, 1928-50).

Rit Lúndbunadardeildar 1953: B-Flokkur: No. 4: Pp. 115.

Varietal trials of barley, oats and potatoes are reported. Most of the varieties were introductions from Norway, Sweden or the USA.

2839 PANOS, D. A.

Three years of progress on experimental work at the Hellenic Agricultural Research Station, Larissa, Greece, in 1952-1954 (1955): Pp. 25. (Mimeographed).

The main results of yield trials of local and introduced varieties of forage crops, peanuts and pulses in different regions of Greece are summarized. In many cases, introduced varieties have proved superior to the local unimproved types.

2840 DASKALOV, H.

(A visit of scientists to the People's Republic of China).

Izv. Inst. Rastenievădstvo (News Inst. Pl.-Industr.), Sofia 1954: 7-59. [Bulgarian].

This survey of the principal economic plants cultivated in China mentions breeding research and outstanding varieties among the diverse agricultural and horticultural plants.

2841 (New varieties raised by the Ministry of Agriculture and Forestry in 1954. III. Soya beans, *Phaseolus radiatus*, maize and sweet potato).

Ikushugaku Zasshi/Jap. J. Breeding 1954: 4: p. 110. [Japanese].

Brief descriptions are given of the following new varieties: (1) soya bean, the midseason variety Shimmejiro (Hanayomeibaraki 1 x Nezumisaya [Grey Pod]) and the late type Asomasari (Oitaaki 2 x Kyuma); (2) *Ph. radiatus* 'Daikan 3' (Kinji x Hakui), a midseason variety; (3) maize, Ko 1 [Hybrid 1] (White Dent x Chohin 159), recommended for ensilage, and Ko 1



[Hybrid 1]\* (Ehime Large 1 x Wisconsin 531), an early short-stemmed type; and (4) the red-skinned sweet potato variety Yakeshirazu (Taihaku [Thick White] x Gokoku [Defence of the Country]).

**2842 [Annual report of agricultural progress. I. (Breeding)].**

Ikushugaku Zasshi/Jap. J. Breeding 1955 : 4 : 253-70. [Japanese].

A general survey of Japanese breeding work with plants and silkworms during 1951-52 is given. Bibliographies of published papers are included. The topics dealt with cover breeding methods (including the induction of polyploidy), genetics, the maintenance of elite stocks, and newly released varieties.

**2843 Progress Report of the Institute of Plant Industry, Indore, Madhya Bharat, for the year ending 31st May, 1954 : Pp. 61. (Mimeographed).**

**Cotton.** Further trials of varieties and strains were conducted under the scheme for the development of a local cotton superior in yield and spinning and ginning performance to Malvi 9. Varieties and selections of Upland cotton were also tested; B49-143 exceeded Indore 2 in ginning percentage and staple length. Promising types have been selected from back crosses of colchicine-doubled hybrids between *Gossypium thurberi* and tetraploid cultivated species; selection of interspecific material from Surat, Bombay, is also giving encouraging results. Tests of  $F_1$  hybrids between *G. barbadense* and *G. hirsutum* 'Indore 2' under monsoon conditions led to the conclusion that the hybrids would not be of practical value because of jassid attack and late maturity. Back-cross selections of Indore 2 x *G. barbadense*, with 26.8-39.0 mm. halo length and 23.5-41.6% ginning outturn, have been secured. Of the 19 perennial types tested, Bourbon fuzzy (*G. hirsutum* var. *punctatum*) gave the highest yield.

A sixth major gene,  $li_1$ , for lintlessness in Asiatic cottons has been identified. The homologies of genes for lintlessness in various cottons were elucidated. The linkage groups  $L-Li_a-Lc_1^K$  and  $li_1-Y_a-Lc_3^B$  have been established. The combinations green lint : green fuzz, white lint : green fuzz and white lint : white fuzz are determined by a multiple allelic system, these three combinations each being indivisible in inheritance. The normal green, lethal deficient and Jarila light green types are controlled by a multiple allelic series. The following new

interactions of alleles at the  $R_2$  locus in Asiatic cottons are reported: (1)  $R_2^{HO}$  (green : spotless) reacts with  $R_2^{BO}$  (sun-red : spotless) to give an intense red pigment; (2)  $R_2^{HO}$  is dominant to alleles  $b$  and  $e$  in its expression in the flower but recessive when its effect upon plant-body colour is considered; and (3)  $R_2^{HO}$  interacts with  $R_3^{GO}$  at locus  $R_3$  to produce intense red pigmentation. Progress is reported in selection for wilt resistance.

The simple randomized block proved to be more efficient than the incomplete block design; the random control design offered no advantage over the simple randomized block.

Response to selection for high and low values for halo length has been investigated in hybrid material of *G. arboreum*. In five out of the six crosses analysed progress in selection had not ceased by the  $F_{13}$ . Higher halo length was associated with lower ginning percentage in the  $F_{12}$  of four crosses. High halo length and high yield per plant were associated in the  $F_{12}$ , as in previous generations. A study of the genetic relation between lines selected for high and low values for halo length is in progress.

**Other crops.** Trials were carried out on varieties and strains of sorghum, rice, linseed, groundnut and gram. The linseed selection IPI S5 has outyielded the local type by 20% during a four year period. Linseed varieties found to be resistant to *Fusarium* wilt are now to be used in breeding. Of the 108 varieties tested, 67 displayed field resistance to four races of *Melampsora lini*.

**2844 ALLAN, W.**

**Annual Report of the Department of Agriculture, Nicosia, Cyprus, for the year 1954 : Pp. 42. (Mimeographed).**

**Cereals.** Testing of introduced varieties for rust resistance and other characters continued. Work on the identification of races of *Puccinia graminis* var. *tritici* and *P. triticina* was initiated.

**Broad bean.** Varieties were tested for resistance to *Fusarium oxysporum*.

**2845 Annual Report of the Secretary for Agriculture for the year ended 31st August, 1954.**

Fmg. in S. Afr. 1955 : 30 : No. 348 : 73-200.

In addition to the work described below, results of breeding, selection and varietal trials of numerous crops, including cotton, peach, guava, groundnut, egg plant, pulses and other fruits and vegetables are briefly reported.

\* Presumably some other number is intended.

**Wheat and rye.** Crosses have been effected between common wheat and *Triticum durum*, *T. timopheevi* and *Aegilops* spp. as part of the programme of breeding for disease resistance in the winter rainfall region. Breeding and evaluation of tetraploid rye strains continued.

**Maize.** In view of the shortcomings of the hybrid PP x K64 in the highveld region, breeding is now directed towards the establishment of inbred lines with greater resistance than K64 to *Helminthosporium* leaf blight and black smut and greater drought resistance than PP. Various top crosses and double crosses have been produced and are recommended for different areas in the highveld region. Cytoplasmically male-sterile material has been used in producing double-cross hybrids.

**Barley.** A large number of high-yielding segregates have been obtained from Cape Six-rowed x Barrett's Prior.

**Pennisetum.** *P. typhoides* is being treated with colchicine with the aim of obtaining material which produces fertile hybrids when crossed with *P. purpureum*. The possibility of inducing mutations with other chemicals is being investigated.

**Leguminous forage crops.** Four polycross varieties of lucerne gave significantly higher yields than the SA Standard, and selection C31 outyielded all others. The cross *Lupinus mutabilis* x *L. albo-coccineus* has been effected and may prove useful as a source of disease resistance.

**Fruits.** An improved papaya with hybrid vigour has been obtained by crossing inbred lines from different sources.

Three new South African strawberries, Bien Donné 1, 2 and 3, were released. The first two have large, wedge-shaped fruits and the last small to medium cone-shaped fruits. The second variety bears imperfect flowers with undeveloped stamens and requires cross pollination, while the others have hermaphrodite flowers and are self fertile. All three are vigorous, produce abundant runners and bear attractively coloured fruits which surpass Everbearing in quality.

**Vegetables.** Pretoria Grano, a new onion selected from Texas Grano, is 12–14 days earlier than Early Texas Grano. Hybrids resulting from crosses of a sterile strain with Pretoria Grano and Early Cape Flat are very promising. Wild species of the Cucurbitaceae which may prove of breeding value are being collected and studied cytologically.

Male-sterile lines of the tomato varieties John

Baer, Pritchard and Pearson are being investigated with a view to determining their value in exploiting hybrid vigour. It has been found that the more distant the relationship between two varieties, the higher the yield of their hybrids.

2846 **Annual Report of the Department of Agriculture, Nyasaland Protectorate, for the year 1953/54 (1955) : Pt. II : Pp. 64.**

In addition to the work reported below, varietal trials of cereals, sweet potato, cotton, coffee, castor oil plant, sunflower, fruits and pulses have been carried out.

**Maize.** Synthetic variety No. 1 has been formed from 16 inbred lines and No. 2 from fifteen top crosses of local inbreds with Namalenga. Two of the latter top crosses have been reciprocally crossed to give a double top cross. Twenty inbred lines have been used to produce 190 single cross hybrids. Top crosses with Namalenga as pollen parent have continued to give good yields. Southern Rhodesian strains were higher yielding but more susceptible to *Puccinia polysora* than local selections.

**Tobacco.** Three single plant selections from the dark tobacco Western have shown promise. The burley varieties Stand Upright and Barnet Special have done well in trials.

**Tung.** It appears that clones of the vigorous B-type are unlikely to be outyielded by the A-types (cf. *PBA*, Vol. XXIV, Abst. 2755).

**Groundnut.** The runner varieties U/A29 and SA/A6 have been consistently high-yielding and of good quality, while U/A11, Masambika, Natal Common and Barberton were the most consistently high-yielding of the bunch varieties under trial.

**The National Research Council Review 1954.**

Ottawa : Pp. 262.

2847 *Associate Committee on Plant Breeding. (pp. 208–13).*

*University of Alberta*

Treatment of plants (unspecified) with 2,4-D caused hereditary changes; no single gene mutations were however detected (cf. *PBA*, Vol. XXIV, Abst. 933).

The establishment of aneuploid lines of the wheats Thatcher and Lemhi is almost complete. Chromosome-substitution lines are to be used for the study of the inheritance of growth habit and winter habit in wheat.

Cytogenetical investigations on lucerne continued; an improved technique of crossing was developed.



*University of Manitoba*

Studies on natural and induced polyploidy in some grasses and herbs and on its agronomic significance have been initiated. Many of the grasses, particularly the perennial wheat grasses, commonly found in the prairie region have been reclassified by means of cytogenetical methods.

*University of Saskatchewan*

The genetics and physiology of mutants obtained by exposure of plants (unspecified) to ionizing radiations were investigated to determine the nature of differences between the mutants and parent varieties.

The project on the production of nondetrimental mutants of barley by irradiation continued. Further work was carried out on the development of an aneuploid series of *Triticum durum*. Preliminary results from irradiation experiments and back-crossing suggested that it would be very difficult to obtain monosomic plants of the variety Golden Ball; further attempts will however be made to establish aneuploids in durum wheat. The project of substituting chromosomes of rye in wheat also continued.

**2848 Progress Report of the Forage Crops Laboratory, Saskatoon, Saskatchewan, 1949-1953 (1954) : Pp. 43.**

**Grasses.** A number of promising synthetic varieties of brome have been produced from selected clones. Details are given of the performance of northern and southern types in varietal trials conducted during the period 1949-53.

Selection for plant height is in progress in Fairway (*Agropyron cristatum*) and Summit (*A. desertorum*). *A. intermedium* is being bred for high seed and forage yields, restricted creeping habit, leafiness and aphid resistance. A promising strain with good tolerance of saline soils has been produced.

**Lucerne.** High bacterial wilt resistance has been found in the progeny of crosses involving one susceptible parent. Lines with combined resistance to wilt and *Leptosphaeria pratensis* and plants with a limited degree of resistance to *Ascochyta imperfecta* have been obtained and are to be used for further breeding. Hybrids combining the wilt resistance of one parent with the creeping root habit of the other have been developed. Crosses between selections from Du Puits and selections from Grimm and Ladak have given progenies which are superior to the two last-mentioned varieties in adult and seedling vigour and in forage yield. Seedling and adult vigour appear to be associated and the

former character may prove to be of use in screening for forage yield.

Preliminary experiments have suggested that honey bees are not effective as pollinating agents under cages. A high degree of crossing occurred when flowers were tripped, allowed to self-pollinate and then artificially cross-pollinated, indicating that, unless total elimination of selfed progeny is required, emasculation prior to cross pollination is not necessary.

A diploid form of *Medicago sativa* from Russia is described which may be of value in investigating the origin of tetraploid *M. sativa* (cf. *PBA*, Vol. XXI, Abst. 390) and a study of twin seedlings is reported (cf. *PBA*, Vol. XXI, Abst. 2734).

The absence of one or both of two complementary factors governing the inheritance of purple anthocyanin pigments in the flower results in white flower colour. Several other factors, some of them independent of the above two, appear to be responsible for the intensification of the purple pigment. All the yellow-flowered plants examined carried one of the two complementary factors in addition to up to three or four factors governing the production of yellow pigment. The segregation patterns observed in common lucerne suggest that it is an autotetraploid which has undergone considerable chromosome differentiation so that the tetrasomic patterns of inheritance have been partly replaced by disomic and partially disomic patterns.

Notes on recommended varieties are provided.

**Sweet clover.** Some promising lines with low coumarin content have been developed from a cross between *Melilotus alba* and the coumarin-free species *M. dentata*. During the course of selection for large-seeded strains tolerant of deep planting, it was found that such strains were later, more vigorous and higher in forage yield than small-seeded types. An account is given of the relationship between permeability and spotting of the seed coat (cf. Abst. 1161). Work on the embryology of interspecific crosses is described (cf. *PBA*, Vol. XXIV, Abst. 3090).

**Rape.** Strain S-1221-8-2-4-1, a selection from the variety Argentine, has given high yields of seeds with high oil content and is to be released.

**Sunflower.** The earliness of Early Saratov has been incorporated into S-37-388 and Sunrise by means of back-crossing.

**2849 Progress Report of the Experimental Station, Melfort, Saskatchewan, 1947-1953 (1955) : Pp. 57.**

The results of varietal trials of various cereal, forage and fruit crops conducted at Melfort,

Sask., are reported. Notes are given on recommended varieties of wheat, oats, barley, grasses, lucerne, flax, vegetables and fruits.

**2850 Progress Report of the Central Experimental Farm, Ottawa, Ontario, Canada 1949-1953 (1955) :** Pp. 61.

**Maize.** Cytoplasmic male sterility has been transferred to the inbreds 103 and 106 and is being transferred to other lines. Agronomic data are given on 17 grain hybrids and 15 silage hybrids. In tests of reciprocal double crosses between dent and flint single crosses, it was found that 50% higher seed yields were obtained with flint types as female parent than with dents; other reciprocal differences were not significant.

**Grasses.** Selection for leafiness, lateness and a restricted creeping habit is being carried out in *Phalaris arundinacea*. Three synthetic strains show promise. Attempts are being made to find *Festuca elatior* plants with resistance to *Puccinia coronata*. Of ten varieties tested, Ensign had the highest crude protein content. *F. elatior* var. *arundinacea* is undergoing selection for leafiness and palatability. Selection for winter hardiness in *Lolium perenne* is making satisfactory progress. Timothy plants are being screened for resistance to *Scolecotrichum graminis* with the ultimate aim of introducing this character into the variety Climax. Breeding for productivity and leafiness is in progress in *Bromus inermis*. The main breeding objectives in cocksfoot are winter hardiness, leafiness, seeding capacity and disease resistance.

*Triticum-Agropyron* hybrid lines and their back crosses to wheat lacked hardiness and lost the perennial character after a few generations. The three amphidiploids 391 (*T. dicoccum* x *A. intermedium*), S107 (*T. turgidum* x *A. intermedium*) and S147 (*T. vulgare* x *A. intermedium*) have continued to show promise beyond the ninth generation but are now producing a higher proportion of annual segregates than in early generations. S91 and S107 have each lost about 10 chromosomes from an original 70 and S147 about 24 from an original 84. None of the perennial lines has so far shown much cytological stability.

**Lucerne.** Numerous crosses have been made between creeping-rooted selections and plants with such desirable characters as resistance to bacterial wilt, high seed setting and good forage quality.

Work on male sterility is briefly reported; a full account of this has already been summarized in *PBA*, Vol. XXIII, Abst. 414.

Colchicine-induced octoploids and the hexaploids obtained by crossing octoploids with the normal tetraploids *Medicago sativa* and *M. media* were less satisfactory than normal tetraploids in respect of seed and forage yield. Diploid forms gave even lower forage yields. The average percentage frequencies of univalents : bivalents : multivalents during metaphase I in normal tetraploids, octoploids and hexaploids were, respectively, 1.1 : 88.6 : 10.3, 1.9 : 65.8 : 32.3 and 2.2 : 52.2 : 45.6. It is thought that the tetraploid form originated as a cross between two diploids with partially homologous genomes, followed by chromosome doubling.

**Red clover.** Double-cut varieties are being bred for resistance to *Sclerotinia trifoliorum*. Lasalle and Purdue gave the highest yields in tests in 1953. Colchicine-induced tetraploids with high vegetative vigour are undergoing selection for fertility.

**Ladino clover.** Maternal line selection and controlled crossing are being used in breeding for hardiness and vigour.

**Alsike clover.** During metaphase I of colchicine-induced tetraploids, the average frequencies of chromosome associations per cell were: univalents, 0.37; bivalents, 5.95; trivalents, 0.14; and quadrivalents, 4.80. Quadrivalents disjoined normally at anaphase. Pollen viability was higher than in diploids while seed setting ranged from 46 to 76 seeds per head. Selection for improved fertility is in progress.

**Birdsfoot trefoil.** Chromosome doubling has been induced by colchicine treatment in *Lotus corniculatus* ( $2n = 24$ ), *L. tenuis* ( $2n = 12$ ), *L. uliginosus* var. *glabriusculus* ( $2n = 12$ ) and *L. uliginosus* var. *villosus* ( $2n = 12$ ). Attempts to cross normal *L. corniculatus* with its induced octoploid and with the induced tetraploids were unsuccessful. *L. corniculatus* octoploids have shown increase in vegetative vigour to various extents and may respond to selection.

**Rape.** Colchicine-induced chromosome doubling has given more satisfactory results in respect of vigour and fertility in the diploid Polish rape ( $2n = 20$ ) than in the polyploid Argentine rape ( $2n = 38$ ). The yield and quality of oil in tetraploid Polish rape are variable and offer scope for selection. The tetraploid plants had 94% good pollen and the following frequencies of chromosome associations per meiotic cell: univalents, 0.03; bivalents, 8.92; trivalents, 0.03; and quadrivalents, 5.51.

**Soya bean.** The varieties Acme, selected from Pagoda, and Comet, selected from a cross between Pagoda and Mandarin, were released in



1953 (cf. Abst. 1711). Breeding for desirable plant type, yellow seed colour, seed quality and resistance to disease, lodging and shattering is in progress.

2851 Ministerio de Agricultura e Industrias, Costa Rica. Memoria 1953. (**Ministry of Agriculture and Industry, Costa Rica. Report for 1953**). 1954 : Pp. 280.

Variety tests have been made with sugar cane and tobacco.

**Maize.** Some of the varieties tested, in particular those from Cuba, have yielded 25–30% more than the local maize Mayorbella. Promising results have been obtained from some single, triple and double-cross hybrids, including Rocamex 520C, and some crosses have been made between local inbred lines and 17 single crosses.

**Rice.** Two groups, one for the valleys and one for higher levels, have been selected. The variety Centenario [Centenary] is equal to Rexoro in quality and ripens in 120 days, being at the same time entirely free from lodging and suitable for mechanical harvesting.

**Potato.** New varieties resistant to *Phytophthora infestans* have exceeded the old local varieties by 30% in yield of tubers. Varieties introduced from the Netherlands proved very susceptible.

**Coffee.** Comparisons have been made of a number of lines selected for high yield, together with a type known as Híbrido [Hybrid] and some improved varieties introduced from Brazil.

2852 **Report of the Governing Body and the Principal's Report of the Imperial College of Tropical Agriculture for 1953–54 (1955)** : Pp. 54.

**Cacao.** Preliminary data suggest that flavour is an inherent characteristic of a clone, although it may be modified by fermenting conditions.

A programme of breeding commercially acceptable cacao resistant to witches' broom has been initiated in collaboration with the Trinidad Department of Agriculture.

The resistance of Amazonian cacao to witches' broom has proved to be dominant.

New seedlings raised include a number from *Theobroma cacao* x *Th. angustifolia* and *Th. cacao* x *Th. grandiflora*; some of the seeds from these crosses were treated with colchicine in an attempt to induce tetraploidy. Further crosses between ICS clones were effected. Study of the genetics of incompatibility among progenies at River Estate is under way.

**Banana.** Breeding and selection of new male parents continued. Work on the taxonomy of edible bananas has been completed; *Musa paradisiaca* and *M. sapientum* are both stated to be hybrids. Analysis of the inheritance of bract pigmentation in interspecific crosses and back crosses is providing information on relationships between species and between the sections *Eumusa* and *Rhodochlamys* as a whole. Further investigations are being carried out on structural chromosome hybrids in *M. acuminata*, meiosis in edible bananas and on seed fertility in Gros Michel and other edible varieties. Final arrangements have been completed for a collecting expedition to the Far East.

2853 **Sixty-fifth Annual Report of the South Carolina Agricultural Experiment Station of Clemson Agricultural College, for the year ended June 30, 1952 (1953)** : Pp. 117.

In addition to the researches summarized below, details are given of varietal trials of wheat, oats, maize, sweet potato, cotton, groundnut, water melon and soya bean.

**Barley.** A new variety, Marconee (Hooded x Wong), which gave the highest yield in the 1952 trials at Clemson, is to undergo further trial before being released.

**Cayenne pepper.** Male sterility has been found to occur in a number of plants and the possibility of using this character for the purpose of simplifying the cross-pollinating operations involved in producing heterotic seed is being investigated.

**Cucumber.** An attempt is being made to transfer anthracnose resistance from some Indian varieties to mildew-resistant lines with desirable fruit and leaf characters.

2854 **Sixty-seventh Annual Report of the Director of the Mississippi Agricultural Experiment Station for the fiscal year ending June 30, 1954** : Pp. 127.

Varietal trials of grasses, legumes, potato, sugar cane, fruits and vegetables have been conducted in various localities. In addition, the following work has been carried out:—

**Wheat.** The back-cross method is being used in an attempt to produce shorter straw and greater resistance to leaf and stem rust, powdery mildew, *Septoria* leaf blotch and loose smut in three commercial varieties.

**Oats.** Breeding for disease resistance, tolerance of cold and resistance to lodging is being effected by hybridization of native oats with foreign varieties which are resistant to one or more

diseases. Two new selections, CI6910 and CI6918, have the Santa Fe type of crown rust resistance, while CI6911 and CI6917 have the Landhafer type.

**Rye.** Breeding for short straw and resistance to leaf and stem rust, anthracnose and *Helminthosporium* leaf blight is in progress. A leaf-rust resistant strain of Abruzzi has been developed.

**Maize.** The incorporation of male sterility into inbred lines continued. The double cross hybrid Miss.1123 has again ranked high in yield and lodging resistance. Adapted hybrids continued to do better under drought conditions than open-pollinated varieties.

**Barley.** Three varieties are being back-crossed with the aim of shortening their straw, improving their disease resistance and making them awnless or hooded.

**Grasses.** A polycross nursery of cocksfoot plants selected for vigour, leafiness and disease resistance is being established. Crown-rust resistant lines of ryegrass with different degrees of self fertility have been isolated. Segregates from crosses of Johnson grass with Hodo sorghum show wide variation in plant type and are being selected for disease resistance and carbohydrate content.

**Sweet potato.** Crosses have been made between plants with wilt and nematode tolerance and high-yielding plants with good flower and seed production.

**Cotton.** The highest degree of resistance to *Verticillium* wilt in Upland cottons has so far been found in Alabama Hybrid 81-14, Auburn 56, Alabama Hybrid 257-202 and Hartsville; the first three of these are also resistant to *Fusarium* wilt. A character known as D<sub>2</sub> smoothness is controlled by one partially dominant gene and is being used in the production of economically desirable types. Development of brown lint appears to involve genes at two loci. Work on the inheritance of deciduous and flaring bracts is in progress. Nematode resistance, freedom from boll-weevil damage and tolerance of *Verticillium* and *Fusarium* wilts have been found among the 16 wild and cultivated species being grown at the Delta Branch Station.

**Brassica.** From work with crosses between black-rot resistant and susceptible lines of cabbage it appears that resistance is controlled by one or a few factors. Tolerance of black rot has been found in several cauliflower types and selection for resistance is being carried out in this and other *Brassica* crops.

**Tomato.** Two smooth-fruited lines which are almost immune from *Fusarium* wilt are segregating for fruit size or plant type.

**Bean.** Breeding to combine desirable qualities from bush and pole varieties of snap bean is being carried out in an attempt to produce a bush type suitable for canning and freezing.

**Cowpea.** Selections with a high degree of resistance to individual races of *Fusarium* wilt have been obtained, but no variety has proved to be simultaneously resistant to all the three known races.

**Soya bean.** Breeding to produce adapted varieties which reach maturity between early September and early November is in progress. Many selections have shown resistance to a fungus disease called target spot.

2855 **Science serving agriculture. Pt. I. Biennial report of the Oklahoma Agricultural Experiment Station, July 1, 1950, to June 30, 1952 (1952) :** Pp. 64.

Breeding and other projects are listed. The following investigations are among those referred to more fully:—

**Cereals.** Back-cross derivatives of hybrids between wheat and *Agropyron elongatum* are being developed in breeding for rust resistance and other characters. Breeding for greenbug resistance in wheat and barley is receiving attention. Strains of Korean barley exhibit a high degree of resistance to this pest and have been used in hybridization. Incorporation of resistance to loose smut and leaf diseases into green-bug resistant barleys is being attempted. The wheat Ponca (cf. *PBA*, Vol. XXII, Abst. 1096), barley Harbine (cf. *PBA*, Vol. XXI, Abst. 1023), maize hybrid Okla. 301 (cf. *PBA*, Vol. XXIV, Abst. 309) and grain sorghums Darset, Dwarf Kafir 44-14 and Redlan (cf. *PBA*, Vol. XXIII, Absts. 348 and 351) were released. Oat breeding continued.

**Cotton.** New strains combining resistance to storm conditions and bacterial blight are among those under test.

2856 **Progress of agricultural research in Indiana. Sixty-seventh Annual Report of the Director, Purdue Agricultural Experiment Station, for the year ending June 30, 1954 :** Pp. 135.

In addition to the work summarized below, varietal trials of grasses, lucerne, clover, potato, sweet potato, onion, musk melon, water melon and beans are reported.

**Oats.** Clintland, a new spring variety combining resistance to crown rust with the desirable



characters of Clinton 59, has been released (cf. *PBA*, Vol. XXIV, Abst. 273).

**Maize.** Male sterility is being introduced into the dent corns H21 and 33-16. Of some 25 inbred lines tested in 1952, Ia 153 was the only yellow line that completely restored fertility in male-sterile Texas, the ability to restore fertility apparently being controlled by two factors. Genes for waxiness are being incorporated into blight resistant lines and lines with high oil content. The cross-sterility factor *Ga*<sup>3</sup> is being introduced into a number of waxy lines and white inbreds. The hybrid AES510 has proved superior to Iowa 4308 in yield and standing ability and the late white hybrid Ind.902A has done better than Ind.909 in recent trials.

Breeding for resistance to *Helminthosporium turcicum* and *H. maydis* is in progress.

**Lucerne.** A synthetic variety involving four clones with almost complete resistance to *Pseudopeziza* leaf spot outyielded Ranger by 14% in the absence of the pathogen and showed some tolerance of leafhopper yellowing.

**Red clover.** In terms of seed yield, bumble bees used as pollinating agents proved to be 35 to 500% more effective than honey bees.

**Apple.** Of several hundred scab-resistant seedlings which fruited in 1953 two early types carrying the single *Malus floribunda* gene for field immunity from apple scab show promise; one resembles Golden Delicious and the other Wealthy. A BX<sub>1</sub> seedling obtained from a line of breeding involving *M. zumi* var. *calocarpa* incorporates the scab resistance of the latter but has larger fruits resembling Jonathan.

**Spinach.** The staminate plant was shown to be heterogenetic, sex determination being controlled by at least one major factor with three alleles and many modifying genes.

**Tomato.** Several selections with multiple resistance to *Septoria* leaf spot, *Fusarium* wilt and grey leaf spot (*Stemphylium*) have shown promise. Breeding for resistance to races 1 and 2 of *Fusarium* wilt is in progress. When male-fertile and male-sterile lines of Garden State and Rutgers were hybridized with the varieties Pritchard, Alpine and Bounty, hybrids with a male-sterile line as ♂ parent were generally later but higher-yielding than those with a fertile line as ♂ parent.

Anther development in the F<sub>1</sub> of a cross between a mutant without stamens (*sl*) and a mutant with vestigial anthers appeared almost normal, indicating that the two genes are not allelic or that modifying genes are present.

Of 25 hybrids and varieties tested for greenhouse forcing, Spartan Hybrid and Table Talk x Gulf State Market excelled in yield and quality.

**Soya bean.** Clark (cf. *PBA*, Vol. XXIV, Abst. 751) was released in 1953. A new Canadian variety, Harosoy, is equal or superior to Hawkeye in yield, two days earlier and less susceptible to stem canker.

Ten homozygous selections from Lincoln x Ogden are higher-yielding than Clark, resemble Perry in maturity and have a high oil content. Other good strains are selections from Wabash x Mandarin (Ottawa), Hawkeye x Mandarin (Ottawa), Mandarin (Ottawa) x Lincoln and Wabash x Hawkeye.

Breeding for resistance to *Septoria glycines* is in progress. In Wabash and Lincoln, resistance to *Cercospora sojina* is controlled by a dominant Mendelian factor CS.

**Sweet corn.** Golden Harvest has exceeded Golden Cross Bantam and Hoosier Gold in resistance to bacterial wilt.

## 2587 Fall Field Day Report of the Fort Hays Branch Station, Hays, Kansas for 1953-54.

Circ. Kans. agric. Exp. Sta. 1954 : No. 315 : Pp. 29.

In addition to variety tests of cereals and other crops, the following work is briefly reported:—

**Wheat.** Breeding varieties with improvements in agronomic properties and milling and baking qualities is in progress. Pawnee has shown a high degree of susceptibility to wheat streak mosaic under both field and experimental conditions; Kiowa has proved to be the most tolerant variety.

**Sorghum.** Cytoplasmically male-sterile lines are being developed for use in hybrid seed production.

## 2588 WORZELLA, W. W. ET AL.

### Research in crops and soils. A progress report.

Circ. S. Dak. agric. Exp. Sta. 1955 : No. 113 : Pp. 19.

The results of variety trials recently carried out in South Dakota on cereals, forage grasses and legumes, linseed and soya bean are summarized.

## 2589 Research serves Colorado agriculture. Sixty-fifth Annual Report of the Colorado Agricultural Experiment Station, 1952 : Pp. 51.

**Maize.** Five new hybrids have given significantly higher yields than Colorado 152.

**Barley.** Resistance to a disorder resembling virus yellows is being transferred from some

recently developed strains to commercial varieties.

**Sugar beet.** Varieties 304 and 359 have shown moderate resistance to *Fusarium* yellows.

**2860 64th and 65th Annual Reports of the New Mexico Agricultural Experiment Station 1952-53** (1954) : Pp. 75; 1953-54 (1955) : Pp. 69.

In addition to the work described below, varietal trials of cereals, potato, fruits, tomato and other crops have been carried out.

**Wheat.** Selections were made in an  $F_2$  population of the winter wheat hybrid Triumph x Blackhull-Oro-Pawnee CI12516 with a view to obtaining a better early variety than Triumph.  $F_3$  lines from the cross Westar x Hard Federation Hybrid CI12515 are also undergoing selection. Resistance to timothy mites was found in the Australian varieties Major, Pinnacle and Quadrat and in several *Agropyron* x *Triticum* hybrids.

**Sorghum.** Two new broomcorn types, Double Dwarf Fulltip x Tan-1 and Dwarf Selection x Double Dwarf Broomcorn-Shallu, have shown promise. Hybrid lines from the cross Dwarf Kafir x Sedan Red Kafir, which was effected with the aim of producing a high-yielding combine type of kafir, appear to be segregating for resistance to corn leaf aphid. Two nearly homozygous lines from a cross of Sedan Kafir with a sweet-stalked strain show promise as forage varieties and are undergoing further selection. Eleven milo-kafir crosses have been effected with the aim of producing male-sterile kafir types.

**Lucerne.** High-yielding mother plants have been isolated and are to be used as a basis for building up synthetic strains. A high-yielding synthetic variety (11-1) was released in 1953; it has greater disease resistance and vigour than New Mexico Common.

**Cotton.** Trials of hybrids and selections of Hartsville and Acala have indicated that the high wilt tolerance of certain Hartsville selections may be transferred to Acala strains. Three types of resistance to bacterial blight have been identified in Acala cottons. Eight sources of blight resistance, including resistant strains of Rowden, Mebane, Lankhart, Stoneville and Northern Star, all appear to carry a single gene for resistance. A number of promising early lines carrying the Stoneville 20 gene for blight resistance have been obtained from BR Acala x BR Empire. A few plants from crosses involving the blight-tolerant line Acala 8373 have shown resistance to a new race of the blight

organism which has overcome the resistance conferred by the Stoneville 20 factor. A lethal chlorophyll deficiency disorder of seedlings, known as WE, has been found to be monogenically determined.

**Chilli.** Improved 6, a selection from College 6, is similar to the parent variety in yield but produces a slightly heavier fruit of more pungent flavour. It is highly resistant to blossom end rot. College 9 x College 6 is a promising hybrid with fruits of good flavour suitable for use in the green or dried state. Two further hybrid strains are of very early maturity and have given good yields of pungently-flavoured fruits. Two selections from native varieties with high seedling vigour have been crossed with southern strains in an attempt to produce a high-yielding, widely adapted variety of good quality.

**Oil plants.** Stiff-stalked lines with an erect habit have been selected from the highly variable native oilseed plant *Proboscidea parviflora*.

**Onion.** Close pollination and selection of inbred lines of White Grano are continuing with the aim of developing early high-yielding varieties with uniform, well-shaped bulbs.

**Bean.** Breeding objectives include earliness, high quality, bush habit and resistance to shattering, drought and diseases. Some rust-resistant strains have been isolated. *Phaseolus acutifolius* var. *latifolius* has shown high resistance to bacterial blight. Crosses between commercial varieties and lines with resistance to rust or bacterial blight have been effected with the aim of obtaining segregates with desirable combinations of characters.

**2861 DEL CARPIO B., R.**

Memoria anual correspondiente a los años 1949-50, 1950-51, 1951-52 y 1952-53. Parte II. Actividades del Departamento de Agronomía y Genética. (Annual report corresponding to the years 1949-50, 1950-51, 1951-52 and 1952-53. II. Activities of the Department of Agronomy and Genetics).

Estac. exp. agríc. Cañete 1953 : Pp. 51. (Mimeographed).

**Maize.** The hybrid Cañete No. 1, formed by crossing the inbred LM4, as female parent, with Arizona White as male, yielded over 15,000 kg. of grain per fanegada (= 2.89 ha.) in 1949 but was not popular because of the pale colour of the grain; the yellow-grained variety Colombiano Fumagalli was therefore substituted for Arizona White and the new hybrid was named



**Cañete No. 2.** A number of other hybrids are under observation. In several of the tests, hybrids in which one parent was Colombiano Fumagalli outyielded all other hybrids and varieties; in some the synthetic SNA4 (1920 x 4142) was the best in yield and also in freedom from attack by borer (*Diatraea saccharalis*). Other hybrids are indicated as possessing resistance to *Euxesta annonae*.

**Potato.** A collection of some 300 local varieties has been examined and the most popular of them, Chata Blanca de Huasahuasi [Huasahuasi Flat White] has been subjected to selection; others have been used in crossing with the object of producing forms combining high yield and quality of tubers with resistance to *Phytophthora infestans*; Ticanel and certain other local varieties, and forms of *Solanum acaule*, were used as resistant parents in crosses with Huasahuasi.

**Sweet potato.** A collection of varieties embracing a wide range of types, including a number of introductions from abroad, is under observation. Some local varieties are distinguished by high carotene content; one of them, Paramonguino, is also superior in yield, earliness and quality and nutritive value of the tubers and is being subjected to clonal and seedling selection.

**Cotton.** Some of the best selections of Tangüis have suffered somewhat from nematode attack but in healthy areas have given significant increases in yield of lint compared with the old standard P46. Some have shown superiority in earliness or in lint quality. Only one of the selections resistant to wilt (*Verticillium albo-atrum*) was in the top group as regards yield; those obtained from La Molina as resistant were not promising, apparently owing to differences in the biotypes of the parasite.

**Beans.** A new selection of the variety Canario of *Phaseolus vulgaris* has been distributed on account of its resistance to *Sclerotinia*. Improved selections of the variety Cocacho have also been made.

2862 **Fourth Annual Progress Report of the Oficina de Investigaciones Especiales, Colombia, May 1, 1953—May 1, 1954:** Pp. 156. (Mimeographed).

**Wheat.** The variety Menkemen is ready for large-scale distribution to farmers; a still better wheat, Bonza Yaqui x Kentana, is now at the stage of preliminary increase. Both varieties were selected from material obtained from the Rockefeller Foundation in Mexico. Of the crosses made in 1950 at the La Picota station, two have given particularly promising results;

their pedigrees are given as Kl Com (N-Mt) Men and Men sib (Y-Kt) sib. Further crosses were made in 1953, using introduced wheats and advanced generation lines from locally made crosses. The resistance of Menkemen to yellow rust (*Puccinia glumarum*) is being improved by crossing with the highly resistant wheats Chin 166 and McMurachy.

**Maize.** The Oficina de Investigaciones Especiales is operating with the US National Research Council in an international project for the collection and preservation of native varieties in Colombia and other countries in the Americas. Work on the classification of local Colombian varieties is under way. The collection of Colombian and foreign varieties is also being screened for superior germ plasm at the different stations.

Details are given of improvement by hybrid production and other means at the Bogotá, Palmira, Monteria and Medellín stations. The usual type of information on the inbred and hybrid material in hand includes the following points of especial interest. At the Bogotá station (2600 m.) one objective is the development of varieties early enough to ripen in the colder and short growing season without undue sacrifice of yielding capacity. One line of investigation is the production of synthetic varieties. In an attempt to develop a suitable sweet corn, Peruvian sweet corns have been crossed with the flour type Boy.383. At Palmira (1000 m.), planting 3-4 weeks before the rainy season combined with irrigation, instead of the former practice of planting at the beginning of the season, has in various ways facilitated breeding work. Since the available yellow lines give better results than the white material, back-crossing is being carried out with the ultimate aim of producing inbreds resembling the yellow lines but with white seed. At the Monteria station (50 m.), a modified hybrid with harder grain is being developed, with the same type of pedigree as Roco H-201. At Medellín (1500 m.), a selection of E10 has been obtained which is expected to be the source of several high-yielding white lines. In earlier breeding, crosses between local lines and lines obtained from breeders in the USA proved to be of little value. After several back crosses to the local lines and continued selection, however, it has been possible to transfer certain desirable characteristics of the US lines to local lines; the lines improved in this way are showing considerable promise.

**Barley.** The selections FR77-1 and FR1252 are undergoing increase prior to their probable

commercial distribution; FR77-1 was selected from the Australian variety Research, FR1252 from a farmer's field. Varieties chosen from the world collection, which was obtained from the US Department of Agriculture, are being used in hybridization.

**Potato.** The Tibaytata station is the centre of research, with supplementary work at Bonza, La Isla, Usme and Obonuco. Lines resistant to late blight are being developed by crossing cultivated varieties with wild species, followed by back crossing. Another group of lines combining early maturity and high yielding capacity is also being produced, mainly from crosses between *S. tuberosum* and *S. andigenum*. Lines from these two groups are to be crossed to combine all three characters.

**Bean.** At Bogotá hybrids from crosses involving Liborino are being selected to obtain lines combining the adaptability of this variety to the cold climate of the region with the desirable characters of other varieties. Derivatives of crosses between Algarrobo and Estrada Rosado show some promise for the regions with a temperate climate. Crosses between native and introduced varieties are also under investigation. It is expected that multiple crossing will be required to develop varieties possessing a sufficient number of the desired properties. Inheritance of resistance to angular and *Cercospora* leaf spots is to be investigated.

2863 SIRKS, M. J.

**The Royal Horticultural Society and the science of genetics.**

J. R. hort. Soc. 1955 : 80 : 214-19.

Nineteenth and early twentieth century investigations on plant breeding are briefly surveyed and the work of the Royal Horticultural Society in promoting interest in genetics is outlined.

2864 SINGLETON, W. R.

**The contribution of radiation genetics to agriculture.**

Agron. J. 1955 : 47 : 113-17.

In relation to crop improvement, the author gives a short survey of early and more recent investigations on radiation-induced mutants in Sweden and the USA.

2865 KAPPERT, H.

**Probleme und Erfolge der modernen Pflanzenzüchtung. (Problems and achievements of modern plant breeding).**

Arch. Klaus-Stift. VererbForsch. 1954 : 29 : 318-39.

The author, rejecting the view that the limits of

quantitative and qualitative improvement of crop plants by breeding have already been reached, discusses how further advances may be made by applying various modern techniques devised by the breeder and geneticist, e.g. convergent breeding and induced mutation, to obtain better crops of cereals, beet, tomatoes, legumes and oil crops.

2866 CHODAT, F.

**Les tendances actuelles de l'aristomixie. Remarques sur la sélection. (Current trends in aristomixis. Notes on breeding).**

Rev. hort. suisse 1955 : 28 : 151-54.

The new term "aristomixis" is proposed, signifying selection followed by hybridization between élite lines. The relative merits of a number of breeding methods, including mass and pedigree selection, open pollination, back crossing and the top-cross method are then discussed.

2867 **The Agriculture Division of FAO. A summary of its organization, developments and accomplishments from 2 December 1946 to 31 December 1954.**

FAO UN, Rome 1955 : Pp. 153. (Mimeographed).

The section entitled Plant production includes an outline of progress in the international schemes on the breeding of maize (cf. *PBA*, Vol. XXIV, Abst. 2898), rice (cf. *PBA*, Vol. XXV, Absts. 2006-12) and wheat and barley (cf. Abst. 2883). Reference is also made to (1) the introduction of trial material of many crops through the UNRRA-Transfer Fund into China, (2) steps taken to facilitate introduction of crop varieties in Czechoslovakia, (3) the development of a plan for the testing of imported varieties of cotton in Ethiopia, (4) the world catalogues of genetic stocks of wheat and rice, (5) activities in connexion with seed production and certification and (6) distribution of seed of cereals, herbage species and forage beets for experimental purposes.

2868 ROBERTSON, D. W.

**Plant breeders need "blood bank" to insure superior new crop varieties.**

What's New Crops Soils 1955 : 7 : No. 5 : p. 20.

The establishment of national seed storage facilities in the USA to provide a means of maintaining seed of possible breeding value is urged.



- 2869 **Heterosis-Sitzung in der Deutschen Akademie der Landwirtschaftswissenschaften am 18. 11. 1954. (Heterosis meeting at the German Academy of Agricultural Sciences on 18. 11. 1954).** Dtsch. Landw., Berl. 1955 : 6 : 94-95.

A brief account is given of papers read at the above meeting, at which the practical application of heterosis effects to plant and animal breeding was discussed. W. Hoffmann spoke on the basic principles of heterosis, the various theories that have been put forward to explain it and results obtained with maize in the USA. Professor Stahl dealt with hybrid vigour in domestic animals. Professor Oberdorf gave an account of current work on inbred lines of maize at the Bernburg Plant Breeding Institute. High-yielding hybrids suitable for fodder or silage have been obtained from crosses between inbred lines of Bernburger Fettmais [Bernburg Oil Maize]. Dr. Vettel spoke on results obtained by crossing inbred lines of rye at the Hadmersleben Research Station. A number of hybrids produced at this station retain their heterosis effect for several generations. Professor Heinisch's paper dealt with the application of heterosis to beet breeding at Kleinwanzleben.

- 2870 **MANŽELIŬ, I. I.**  
(At the Lenin Academy of Agricultural Sciences).  
Agrobiologija (Agrobiology) 1955 : No. 1 : 150-53. [Russian].

This report of a meeting in December 1954 refers very briefly to plant breeding at various institutes. Lysenko read a paper, entitled Some questions concerning the problems of biological species and origin of species.

- 2871 **VAN DER KLEY, F. K.**  
**The efficiency of some selection methods in populations resulting from crosses between self-fertilizing plants.**  
Euphytica, Wageningen 1955 : 4 : 58-66.

After calculations on the value of various selection methods, the author concludes that a gradual selection procedure involving the elimination of an increasing number of recessive detrimental genes in successive generations, followed by line selection, is more efficient than the pedigree, bulk and mass pedigree methods which have the drawback that valuable genotypes may be inadvertently rejected.

- 2872 **SCHIEMANN, E.**  
**Die Geschichte der Kulturpflanzen im Wandel der biologischen Methoden. (The history of cultivated plants in relation to changing biological methods).**  
Bot. Tidsskr. 1954 : 51 : 308-29.

In this paper, which was presented at the 8th International Botanical Congress in Paris, July 1954, the various scientific disciplines applicable to the study of the evolution of economic plants are surveyed and some results achieved since the middle of the nineteenth century through the use of archeological, geological, genetical, cytological, radiological and other techniques are reviewed in chronological order.

- 2873 **HARLAN, J. R.**  
**Crops, weeds, and revolution.**  
Sci. Mon., NY 1955 : 80 : 299-302.

A popular account of the origin and early history of cultivated crops is given, with particular reference to cytogenetical evidence relating to the development of the various forms of wheat from wild species. The possible origins of tobacco, maize, banana and other crops are touched upon and the theory that some crop plants may have arisen as weeds is discussed.

- 2874 **BRAGDØ, M.**  
**Production of polyploids by colchicine.**  
Euphytica, Wageningen 1955 : 4 : 76-82.

A description is given of the procedures adopted at the Institute of Genetics and Plant Breeding, Agricultural College of Norway, for producing tetraploids by colchicine treatment. In red clover, Alsike clover and spinach, smearing the growing points of seedlings with agar containing colchicine is the most satisfactory method, while in turnip, lettuce and winter rye soaking the seed with colchicine solution is preferred. Some of the varieties in which tetraploids have been produced are listed and methods of distinguishing and multiplying the polyploid material are described.

- 2875 **MAURIZIO, A.**  
**Untersuchungen über die Nektarsekretion einiger polyploider Kulturpflanzen. (Investigations on the nectar secretion of some polyploid crop plants).**  
Arch. Klaus-Stift. VererbForsch. 1954 : 29 : 340-46.

Diploid and polyploid forms of species of *Datura*, *Lobelia*, *Monarda*, *Salvia* and *Trifolium* differ in the amount of fructose, glucose and

sucrose in their nectar. Flower counts on *Salvia* and *Trifolium* species showed that polyploid species had fewer flowers per plant than the diploids. This deficiency is, however, compensated for by a higher nectar and sugar secretion from the polyploid flowers (except in *S. splendens*), resulting in a higher sugar production per plant per day in the tetraploids. The polyploid clones have also a longer flowering period.

2876 KRESS, H.

Sortenwertlinien und Anbauzonen. (V.Teil: Hülsen- und Ölfrüchte). [**Varietal evaluation curves and zones of cultivation. (Part V: Leguminous crops and oil plants)**].

Dtsch. Landw., Berl. 1955 : 6 : 313-17.

The relationship between variety and environment is exemplified by an analysis of the yields and regional adaptation of varieties of field bean, sweet yellow lupin, rape, mustard and poppy when grown at a number of separate localities in Eastern Germany (cf. *PBA*, Vol. XXIV, Abst. 3111).

2877 VAN DER KLEY, F. K.

**The occurrence and rates of reproduction of various male sterility genes.**

Genetica 1955 : 27 : 453-64.

The percentage of male-sterile plants expected to occur in natural self- and cross-pollinating populations is calculated, different formulae being derived and used according to whether the male sterility is determined by cytoplasmic inheritance or dominant or recessive single genes. The formulae employed relate the percentage of male sterility to the frequency of mutation and the ratio between the numbers of seeds produced by male-sterile and normal plants (relative fertility). It is concluded that only cytoplasmically male-sterile plants can occur and maintain themselves in high percentages in cross-fertilizing populations, and that in self-fertilizing populations low percentages of all the different kinds of male-sterile plants are to be expected.

2878 JOUKOVSKY [ŽUKOVSKIĬ], P. M.

Les ressources végétales du globe. Leur utilisation en vue de la sélection et de l'amélioration des plantes en U.R.S.S. (**The plant resources of the world. Their utilization with regard to plant breeding and improvement in the USSR**).

J. Agric. trop. Bot. appl. 1954 : 1 : 257-80.

This review of progress achieved in plant

breeding in the USSR since 1917 is devoted primarily to an account of the introduction of new species from Asia, America and Africa, their acclimatization in the USSR and results obtained from distant intergeneric and inter-specific crosses in which they have been employed. The Institute of Applied Botany and Plant Breeding, Leningrad, has carried out a thorough survey of the different forms of maize, wheat, rye, pome and stone fruits and other crops of economic importance in the European and Asiatic territories of the USSR, in addition to sending expeditions to other parts of the world, and its collection of crop plants has made a valuable contribution to the Soviet economy.

2879 RUDOLF, W.

Der Beitrag von Genetik und Züchtung zur Bekämpfung von Viruskrankheiten der Nutzpflanzen. (**The contribution of genetics and breeding to the control of virus diseases of crop plants**).

Veröff. ArbGemein. Forsch. Nordrhein-Westfalen 1953 : No. 32 : 47-67.

The text of a lecture delivered to a meeting of the Research Association of North Rhine-Westphalia in Düsseldorf on 6 May 1953 is presented. In it an attempt is made to assess the economic damage caused by virus diseases to some of the major crop plants and the possibilities of successfully reducing yield losses by breeding immune, resistant or tolerant varieties. The symptoms caused by various viruses, selection for resistance and the incorporation of disease resistance from wild species into cultivated varieties are discussed at some length, with special reference to the mode of inheritance and physiological basis of the different types of resistance and difficulties encountered by the breeder as the result of the appearance of new physiological races. Despite these difficulties it is concluded that breeding for immunity or resistance will pay ample dividends provided the breeder anticipates the occurrence of new biotypes. The mosaic-resistant POJ sugar canes in Java, the development at the Max Planck Institute, Voldagsen, of interspecific potato hybrids simultaneously resistant to both viruses X and Y and the breeding in the USA of sugar-beet varieties resistant to curly-top virus and tobacco varieties resistant to mosaic are among the examples cited as instances of successful breeding in the past. It was observed at Voldagsen that the American bean variety Kentucky Wonder died almost immediately after infection with strain Z of yellow bean mosaic, thus effectively preventing the spread



of the virus to neighbouring plants. In the ensuing discussion S. Strugger and the lecturer dwelt on the biochemical nature of the virus. Both agreed that the conception of the virus having its origin in a detached chromosome particle was unproved.

2880 HOLMES, F. O.

**Additive resistances to specific viral diseases in plants.**

Ann. appl. Biol. 1955 : 42 : 129-39.

The author considers that complete immunity to a pathogen is unlikely to become established in a population as a consequence of natural selection, since, as increasingly resistant host plants evolve, selection pressure automatically decreases. He suggests that in general immunity results from the additive effect of several genes each controlling partial resistance rather than from the action of a single gene. The occurrence of additive resistance to spotted wilt in tomato is noted (cf. *PBA*, Vol. XXIV, Abst. 738) and the types of mosaic resistance found in different species and varieties of tobacco are surveyed, particular reference being made to Java Isère x Cabot (cf. *PBA*, Vol. XXIV, Abst. 1330). The possibility of achieving immunity by combining genes controlling different resistance mechanisms is discussed.

## CEREALS

2881 **Seed bulletin. Spring-sown cereals.**  
Wageningen IVRO, 1955 : Pp. 16.

Descriptions of the main varieties of spring wheat, oats, rye and barley recommended for cultivation in the Netherlands in 1955 are given (cf. Absts. 1880 and 1922).

2882 NICHOLSON, G.

**Oat and barley varieties recommended for 1955 sowings.**

Agric. Gaz. NSW 1955 : 66 : 105-07, 96.

Notes are given on the origin and qualities of 11 oat varieties recommended for the various zones of New South Wales. Five recommended barleys are listed.

2883 **Report of the fourth FAO meeting on wheat and barley breeding in the near East held in Karachi, Pakistan from 14-19 March 1955.**

FAO UN, Rome 1955 : No. 1955/8 : Pp. 18. (Mimeographed).

The meeting was attended by representatives from Egypt, Iran, Jordan, Lebanon, Pakistan, Turkey and the United Kingdom. The report refers to a few of the papers presented, a list of the many contributions being provided.

Attention was drawn to the valuable results being obtained from the cooperative uniform rust and bunt nurseries of wheat and barley and the small-scale yield trials of selections of these cereals. Further work has been carried out on the identification of wheat stem-rust races in the various countries. Notes are given on inoculation techniques recommended for use in breeding for resistance to net blotch (*Helminthosporium teres*), rusts, bunt, flag smut and covered smut. P. F. Pelshenke discussed breeding for quality in wheat. Recommendations are given concerning the tests required for quality evaluation. The establishment of drought observation nurseries was again advocated. Among the matters dealt with in the miscellaneous technical discussions were the following: sources of disease resistance for wheat and barley breeding; the general adaptability of Californian barleys in countries with a Mediterranean climate; the availability of the world collection of barley varieties; and breeding for lodging resistance. The survey given by G. A. Wiebe on the barley breeding in the USA was followed by a discussion concerned chiefly with the use of male sterility and isogenic lines in crop breeding. Information was exchanged on mechanical aids in cereal breeding.

2884 **Guide to field experiments, demonstrations and farm crops, Edinburgh School of Agriculture 1955 : Pp. 90.**

Part III summarizes the results of trials carried out on cereal varieties and grass strains during 1954 on the farms of the Edinburgh School of Agriculture, Scotland. Notes on the cereal varieties grown in the trials and in observation and demonstration plots are provided in Appendix III.

2885 LILLY, A. H. R.

**Cereal variety trials in Yorkshire 1948-54.**

Trans. Yorks. agric. Soc. 1955 : 47-50.

Data are given on the yields of 15 winter wheats, 7 spring wheats, 15 spring oat varieties and 8 spring barleys tested by the National Agricultural Advisory Service. A table showing the standing ability, length of straw, resistance to loose smut and mildew, earliness and grain quality of some of the above and a few additional varieties is also provided.

2886 HARRINGTON, J. B.

**Three new varieties: Antelope winter rye, Husky barley and Torch oats.**

Field Husb. Circ. Saskatch. 1953 : No. 557 : Pp. 2. (Mimeographed).

Further information is given on the rye Antelope

(cf. *PBA*, Vol. XXIV, Abst. 279), the barley Husky (cf. *PBA*, Vol. XXIV, Abst. 1993) and the oat Torch (cf. *PBA*, Vol. XXIII, Abst. 271). Antelope was developed from Korm by a combination of pedigree and mass selection. Torch was bred by crossing Nakota with Hajira x Joannette. As already stated the parentage of Husky was [(Peatland x Regal) x OAC21] x Newal.

## 2887 Cereal news from Canada.

Cereal News 1955 : 2 : No. 2 : 11-18.

**Wheat.** Preliminary trials at Lethbridge, Alta., have indicated that there is some correlation between the winter hardiness of varieties and their reaction to being frozen at the seedling stage before the leaf has emerged from the coleoptile. With improved technique the method may prove useful in screening for winter hardiness.

**Barley.** A triploid plant produced at Lethbridge, Alta., by crossing a colchicine-induced tetraploid strain of Montcalm with the diploid strain is being pollinated with diploid pollen with the aim of establishing a trisomic series in this variety.

2888 SHIER, F. L. & REEVES, J.

### Results for 1954/55 season.

J. Agric. W. Aust. 1955 : 4 : 205-12.

The results of variety trials of wheat, oats and barley in Western Australia are reported. The recently released oat variety Avon [Ballidu x M59 (Mulga x Laggan)] has given high yields in the areas with medium to high rainfall; it is an awnless midseason variety.

2889 FRÖIER, K.

Åke Åkerman död. (Åke Åkerman dead).

Sverig. Utsädesfören Tidskr. 1955 : 65 : 2d-2i.

This obituary notice gives an account of the life and work of Å. Åkerman, late director of the Sveriges Utsädesförening [Swedish Seed Association] and well known for his achievements in cereal breeding.

## 2890 Annual Report of the Department of Agriculture, Basutoland, 1954 : Pp. 76.

The mountain region contains much well-adapted material of cereals, some of it dating back to the middle of the nineteenth century. In both the mountains and foothills the search for suitable varieties is confined to local material and samples of wheat, maize and sorghum have been subjected to selection. In the foothills, introduced sorghums are also under trial. In the lowlands, trials of cereals have so far been

confined to varieties from the Union of South Africa. In this region, hybrid maize introduced from the Union has displayed superiority over open-pollinated types but, until the standard of farming has been raised, use of hybrids is unlikely.

2891 FUKASAWA, H.

### On the free amino acids in anthers of male-sterile wheat and maize.

Idengaku Zasshi/Jap. Genet. 1954 : 29 : 135-37.

Analysis of the free aminoacid content of a male-sterile *Triticum durum* strain with *Aegilops ovata* cytoplasm and the male-sterile maize line WF9 by means of paper chromatography showed that the anthers of the sterile strains contained more asparagine and less proline than the corresponding fertile forms.

2892 HEDIN, L., LEFEBVRE, J. M. & KERGUELEN, M.

Recherches sur la caractérisation chimique d'espèces et de variétés de plantes fourragères et prairiales. (2e mémoire). [Investigations on the chemical characterization of species and varieties of forage and meadow plants. (2nd Report)].

Ann. Inst. nat. Rech. agron., Paris 1954 : Sér. B : 4 : 469-503.

Tabulated data on the chemical composition of the leaves of different varieties of wheat and maize and specimens of cocksfoot, timothy, oat grass and other meadow plants from different areas in France are presented. Differences in mineral content, in particular nitrogen, calcium and potassium, proved sufficiently great to enable cereal varieties and different ecotypes of meadow plants to be distinguished (cf. *PBA*, Vol. XXIII, Abst. 306). On the basis of these results it is suggested that chemical analysis offers a means of establishing the geographical origin, where this is in doubt, of ecotypes of meadow plants since, when grown under identical environmental conditions, ecotypes of the same species will fall into distinct groups according to the region from which they are derived.

## 2893 1954 Report of the Grain Research Laboratory, Winnipeg, Manitoba. 1955 : Pp. 78.

Part I of this report provides an account of investigations on various aspects of quality in hard red spring and durum wheats and barley, including the development of improved prediction tests. Preliminary study of nine barleys has suggested that cytolytic activity is a varietal characteristic which may prove to be an



important factor in evaluating malting quality. Part II summarizes the results of tests on varieties of wheat and barley submitted by breeders. The hard red spring wheats Lake (CT918) and Selkirk (CT186) have been classed as equal to Marquis in quality (cf. *PBA*, Vol. XXIV, Absts. 1786 and 2810). Of the durum wheats, DT 131, 132, 136 and 139, developed at the Dominion Laboratory of Cereal Breeding, Winnipeg, proved to be superior to Mindum in their first year of testing. DT136 is resistant to race 15B of stem rust. Three years' data indicate that the barley Wolfe is inferior to OAC21 in malting quality but agronomically superior; described here as a yellow-aleurone type, it has been licensed as a fodder barley (cf. *PBA*, Vol. XXIV, Abst. 2952).

2894 MAKSIMČUK, L. P.

**(Élite seed and modern aims of seed production in cereals and in legumes grown for their seed).**

Zemledelie (Agriculture) 1955 : No. 4 : 93-105. [Russian].

Contrary to the present instructions that nurserymen in the USSR should improve their élite stocks, the writer considers that amelioration of pure varietal material at this stage is impossible. The production of varieties distinguished by higher yield and improved economic properties should be left to the breeder. The contention that élites cannot be improved in seed nurseries is borne out by analyses of copious data from many institutes engaged in raising and testing élites. An exception is made in the case of the millet Veselyi Podol 367 and the winter wheats Ivanovskaja 2119 and Lesostepka 74 [Woody Steppe 74]. Various methods for improving varieties such as sowing spring wheat upon stubble in late autumn, intervarietal cross pollination and supplementary pollination of cross pollinating plants are rejected.

2895 ITO, S. & NAKAMURA, T.

**(Studies on the critical reaction of the protoplasm of crop plants. II. Resistance to the toxic action of iron and aluminium ions in rice, barley and wheat).**

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 22 : Nos. 3 & 4 : 115-16. [Japanese].

The reaction of 3 rice varieties, 2 barleys and 3 wheats to the toxic action of a graded series of solutions containing iron and aluminium ions was determined. Varietal differences in tolerance of the higher concentrations were noted,

resistance being associated with low critical reaction of the protoplasm of the root epidermis, which was determined by measuring the pH value of the various cell components.

2896 THURMAN, R. L.

**Growth of winter small grains under excessive moisture.**

Sth. Seedsman 1955 : 18 : No. 1 : 46-47.

Of one wheat and four oat varieties grown under conditions of excessive moisture and subsequently exposed to a temperature of  $-7^{\circ}\text{F}$ . for six hours, the wheat, Atlas 66, was least injured by cold and was followed by the oat varieties Arkwin and Traveler. Controls which received normal amounts of water showed less damage.

2897 SCHUSTER, W.

Einige Versuchsergebnisse nach den Frostschäden des Winters 1953/54. (Some experimental results after the frost damage of the winter of 1953-54).

Mitt. dttsch. LandwGes. 1955 : 70 : 377-80.

In trials at different centres in Land Hessen, Germany, the winter wheat Heine IV and the winter barley Breustedts Atlas displayed a high degree of frost resistance.

2898 EKSTRAND, H.

Höstsädens och vallgräsens övervintring. (Overwintering of winter cereals and forage grasses).

Medd. Växtskyddsanst. Stockh. 1955 : No. 67 : Pp. 125.

This treatise on methods of reducing winter damage to cereals and forage grasses includes data on varietal differences in wheat, rye, barley, timothy, meadow fescue, red fescue and *Poa serotina* as regards winter hardiness and susceptibility to a number of fungous diseases, including *Fusarium nivale*, *Typhula borealis*, *Sclerotinia borealis* and *Tilletia itoana*.

2899 SKRIPČINSKIĖ, V. V.

**(Changing winter into spring cereals and spring into winter forms in the light of Ch. Darwin's theory).**

Bot. Ž. (Bot. J.), Moskva 1955 : 40 : No. 1 : 64-90. [Russian].

The experiments on changing the habit of cereals, conducted by Lysenko and his associates during the period 1938-54, are surveyed and criticized for the omission of important scientific safeguards. The claim to have obtained directed changes is regarded as unsubstantiated. Analyses of the experimental facts, stripped of all irrelevancies, suggest (a) that plants sown at

an unaccustomed date produced a diversity of morphological and biological forms and, (b) that changes thus obtained were of a nondirected kind. However, a modified technique for changing spring into hardy winter cereals recently described by Lysenko [cf. *PBA*, Vol. XXIII, Abst. 205] is expected to yield better practical results, since unlike earlier experiments, it provides for conditions promoting natural selection.

## WHEAT

### 2900 GADEA, M.

Quinto año de experiencias con nuevas variedades de trigos. (**Fifth year of experiments with new wheat varieties**).

An. Inst. nac. Invest. agron. Madr. 1952-53 (1954) : 3 : No. 3 : 3-135.

Data for the year 1952-53 are added to those previously published (cf. *PBA*, Vol. XXIV, Abst. 189). Varieties named as especially promising are Aradi, Canaleja, Cabezorro and Pané 247, and some hybrid lines are mentioned as meriting further testing on account of the excellent yields they gave in spite of exceptionally low rainfall. Aradi and Canaleja are being multiplied for release to growers.

### 2901 NICHOLSON, G.

**Wheat varieties. Recommendations for 1955 sowing.**

Agric. Gaz. NSW 1955 : 66 : 59-62, 108-12.

The qualities required in different zones of New South Wales are discussed and notes are given on the characters and origin of 14 recommended and 15 other varieties.

### 2902 NEATBY, K. W.

**Research trends in Canadian agriculture and forestry.**

Ann. appl. Biol. 1955 : 42 : 45-64.

In the course of this general survey of current research, wheat breeding in Canada is reviewed, the main subjects dealt with being resistance to race 15B of stem rust and methods of testing for baking quality. It is noted that Kenya 338 AC 2.E.2 is resistant to a new unnamed stem rust race to which Selkirk is susceptible.

At Ottawa it has been found possible to mature three generations of hybrid spring wheat during the period September-April by growing the material in a chamber with controlled conditions of light and temperature. With the aim of obtaining increased winter hardiness, winter

wheats bearing one pair of chromosomes derived from the winter rye Dakold and 20 pairs from the winter wheat Kharkov MC 22 are to be produced at the University of Saskatchewan from crosses between aneuploid Kharkov wheats and lines which each have a full complement of Kharkov chromosomes and one additional Dakold chromosome.

### 2903 TAYLOR, D. K.

**Winter wheat improvement in the Pacific Northwestern states.**

Cereal News 1955 : 2 : No. 2 : 8-9.

Two promising hard red winter wheat selections developed at Moro, Ore., one of them from Rex-Rio x Nebred and the other from (Blackhull x Rex) x (Rio x Rex), are bunt resistant, have acceptable milling and baking qualities and are suited to nonirrigated conditions. At Pullman, Wash., derivatives of the short-strawed Japanese variety Norin 10 [Ministry of Agriculture and Forestry 10] have given up to 25% higher yields than Elgin and Elmar and are being used in breeding.

### 2904 WATANABE, Y.

**Studies on the cytological instabilities of common wheat. 1. The meiotic abnormalities of dwarf wheat, Norin No. 10, with special reference to the appearance of tall plants.**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 67-76.

The causes of the occurrence of tall plants in the dwarf variety Norin 10 [Ministry of Agriculture and Forestry 10] (Turkey Red x Fultz-Daruma) were investigated. Some of the tall plants were aneuploids ( $2n = 43$ ), others had 42 chromosomes. In both cases, meiosis was irregular and it was also found that irregularities, in particular the occurrence of a pair of univalents, were frequent in the typical dwarf plants.

### 2905 DIONIGI, A.

Grani a levata tardiva e maturazione precoce. (**Wheats that emerge late and ripen early.**)

G. Agric. Domen. 1955 : 65 : p. 138.

To avoid adverse winter and spring conditions, Italian farmers are once again urged (cf. *PBA*, Vol. XXII, Abst. 893) to make use of the new wheats bred for late emergence and early ripening, e.g. S. Pastore 14, Giuliani, Damiano, Titano, S. Marino, M 5, Elia and Ovest. The type of district in Italy to which each of these wheats is suited is indicated.



2906 MAN MOGAN SINGH.

**Epidermal characteristics of plants in relation to earliness in flowering.**  
Sci. & Cult. 1955 : 20 : 506-07.

In a comparison of the early wheat NP165 with the later variety Pb.8-A, it was observed that the number of stomata and epidermal cells per unit area was larger in the former than in the latter.

2907 EL-KHISHEN [AL KHISHIN], A. A.

**Inheritance of earliness in wheat.**  
Alexandria J. agric. Res. 1953 : 1 : 66-72.

Studies carried out at the University of Alexandria on the inheritance of earliness in crosses between the early variety Ramona and the late variety Thatcher indicated that earliness is dominant and governed by a single factor.

2908 HEBERT, T. T. & MIDDLETON, G. K.

**Lethality in a wheat cross.**  
Agron. J. 1955 : 47 : p. 196.

Evidence has been obtained at the North Carolina Agricultural Experiment Station that lethal genes are active in the cross between the soft red winter wheat Atlas 66 and hard red winter variety Quanah. The  $F_1$  plants reached a height of 8-12 inches and developed several tillers before dying.

2909 ZONIĆ, I. & ĐOKIĆ, A.

**(Investigation of the  $F_1$  generations of intergeneric and interspecific hybrids of cereals).**

Zborn. Rad. poljoprivred. Fak./Rev. Res. Wk. Fac. Agric. 1954 : 2 : No. 2 : 165-83. [Serbian].

At Zemun, some interspecific wheat hybrids and direct and reciprocal hybrids between wheat and rye have been produced and the results of cytological, genetical and biometrical analyses of this material are presented. The percentages of grain set varied and depended on differences between the genetical constitutions of the parental forms; more grains were set by hybrids between similar parental genotypes. Of the various crosses between wheat species, the hybrids of *Triticum durum* x *T. dicoccum* set most grains. Direct crosses between rye and wheat were sterile but the reciprocal crosses gave 1.38-14.15% grain. *T. turgidum* x *Secale cereale* was among the hybrids that set more grains than others.

In the crosses between the different wheat species, brittle or hairy rachis was dominant over tough or glabrous rachis and pubescent leaves and glumes over glabrous. In the hybrids of *T. compactum* x *S. cereale*, rye was dominant over wheat in respect of hairiness of

the rachis and wheat over rye in respect of the hairiness and shape of the glumes. The hybrids of *T. durum* x *T. vulgare* and of *T. durum* x *T. dicoccum* displayed heterosis.

Descriptions of meiosis in the various hybrid combinations are given.

2910 KISS, A. & RÉDEI, G.

Kísérletek búza-rozs hibridek (*Triticale*) előállítására. [Production of wheat-rye hybrids (*Triticale*)].  
Növénytermelés 1952 : 1 : 67-84.

Recent Hungarian work on the production of wheat-rye hybrids is summarized. Special attention has been given to hybrids of the wheat varieties Bánkút 1201 and F481. Pollen mixtures of rye varieties have proved useful in increasing the set of hybrid seed. Tetraploid rye has also been used. The kernel weight of the hybrids varied between 28 and 63 mg.

2911 CHAPMAN, V. & RILEY, R.

**Disomic addition of rye chromosome II to wheat.**

Nature, Lond. 1955 : 175 : 1091-92.

A single  $F_1$  plant ( $2n = 49$ ) was obtained at the Cambridge Plant Breeding Institute, England, by crossing a 28-chromosome individual, which arose parthenogenetically in the progeny of the octoploid amphidiploid (*Triticum vulgare* 'Holdfast' x *Secale cereale* 'King II'), with the *T. vulgare* grandparent. The selfed progeny of the 49-chromosome form included a 44-chromosome plant which was disomic for chromosome II of rye. The disomic individual differed from Holdfast in possessing very slight hairiness of the peduncle, a narrow and tapering ear, long and straight lemma points and red grain. O'Mara (cf. *PBA*, Vol. XXII, Abst. 2598) reported that the hairiness of the peduncle in rye depended upon genes in chromosome I; this character therefore appears to depend upon factors in both I and II. Chromosome II paired in only 9.7% of the pollen mother cells in the disomic plant; under greenhouse conditions the plant was approximately as fertile as its *T. vulgare* ancestor. The disomic form is too unstable to be of value in breeding.

2912 SCHMIDT, J. W., HEYNE, E. G., JOHNSTON, C. O. & HANSING, E. D.

**Progress of *Agrotricum* breeding in Kansas.**

Trans. Kans. Acad. Sci. 1953 : 56 : 29-45.

Literature on *Triticum-Agropyron* hybrids is reviewed and experimental work carried out at the Kansas Agricultural Experiment Station is described. In tests of numerous hybrids of wheat and *Agropyron elongatum*, *A. tricho-*

*phorum*, *A. glaucum* and *A. intermedium* for seedling and adult reaction to races of leaf and stem rust, it was found that a large proportion of the hybrids was resistant to stem rust 15B. In many strains, factors governing rust resistance were observed to segregate and appeared to do so independently of those affecting morphological characters. Tests for resistance to bunt, loose smut, mildew, *Septoria* leaf blotch, ergot, yellow streak mosaic, Hessian fly and joint worm were also conducted. In general, the greatest disease resistance was observed in morphologically intermediate types characterized by rough foliage, stiff straw, long lax spike, brittle rachis, partly adherent glume and a wheat-like kernel. These types are fertile and show considerable morphological uniformity. The hybrids were mostly susceptible to Hessian fly attack but some were resistant to joint worm. They have been lacking in winter hardiness. The better strains are to be used in back crosses to adapted and commercially desirable hard red winter wheats.

2913 IRLBUSCH, J.

Untersuchungen zur Klärung der Frage des Herkunftswertes von Winterweizen. (Investigations to elucidate the question of provenance value in winter wheat).

Z. Acker- u. PflBau. 1955 : 99 : 361-92.

The yields, 1000-grain weights, percentage germination and chemical constituents of the grain, growth vigour and osmotic and transpiration values of plants obtained from elite seed of 5 varieties from 14 centres in Eastern Germany were compared at the Agrobiological Institute of the Karl Marx University, Leipzig. Seed pertaining to the same variety but obtained from different ecological regions varied considerably in agronomic value, these variations being as great as those between different varieties. In addition to place of origin, the amount and type of fertilizer given to the material from which the seed stock was derived exercised a considerable effect.

2914 MATSUMURA, S. & FUJII, T.

(Irradiation experiments with ultra-short waves on Einkorn wheat).

Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 13-17. [Japanese].

Dormant seeds of *Triticum monococcum* were exposed to irradiation of wavelength 10 m. In the  $S_2$ , a number of sterile dwarfs were found; in the  $S_3$  from the fertile sibs, sterile dwarfs also occurred but fertility and height were

somewhat improved. In the  $S_4$ , further progress towards normality occurred, and in the  $S_5$  all plants were normal.

2915 LUPTON, F. G. H. & WHITEHOUSE, R. N. H.

Selection methods in the breeding of high yielding wheat varieties.

Heredity 1955 : 9 : 150-51. (Abst.).

At the Cambridge Plant Breeding Institute, England, the problem of choosing the best crosses for further study has been tackled by detailed investigation of potential parents and by conducting yield trials of unselected hybrid populations in the  $F_2$ ,  $F_3$  and  $F_4$ . The value of such trials is considered to be limited by the occurrence of heterosis and by the danger of losing high-yielding cultures in crosses in which the average yield is low. Selection of the best cultures within a cross is being effected by the pedigree technique, selection in the early generations by eye judgment being combined with cubic lattice trials of  $F_2$  plant progenies. If eye judgment alone is used, many promising cultures may be discarded before the stage of yield trials in the  $F_7$  or later generations.

2916 NEVZOROV, V. V. & KREĖDIK, B. M.

(Breeders from the people and some achievements in popular breeding).

Zemledelie (Agriculture) 1955 : No. 3 : 98-102. [Russian].

Brief descriptions of a few wheats and a linseed variety that have been selected and cultivated for many years in Central Asia are given. The wheats produce large vitreous grains and show resistance to drought, lodging and diseases. The linseed exceeds Gissarskii 474 in oil content and gives results superior to those of the best cultivated and local brown-seeded strains in Tadzhikistan.

2917 JAKUBCINER, M. M.

(New data on the wild wheat *Triticum araraticum* Jakubc.).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 199-200. [Russian].

A number of new locations are indicated for this species in Armenia, Nahičevan and Azerbaijan. Hybrids of *T. araraticum* x *Aegilops cylindricum* have also been found.

It is pointed out that the original description of the species appeared under the name *T. dicoccoides* ssp. *armeniicum*.

2918 MORRISON, J. W.

Dicentric in wheat.

Science 1955 : 121 : 604-05.

Two  $F_2$  seedlings derived from *Triticum aestivum*



x *T. durum* have been found to contain a dicentric. One plant had 27 and the other 39 normal chromosomes in the root-tip cells containing the dicentric. The fact that the dicentrics were not isodicentrics provides support for the author's view that a dicentric may arise through breakage and fusion of two nonhomologous univalents in  $F_1$  meiosis (cf. *PBA*, Vol. XXIV, Abst. 2815). It is suggested that  $F_2$  seed from interspecific crosses may be a likely source of dicentrics.

- 2919 BELL, G. D. H. & RILEY, R.  
**Breeding techniques with  $F_1$  sterile combinations, in the *Triticinae*.**  
*Heredity* 1955 : 9 : p. 150. (Abst.).

Breeding is in progress at the Plant Breeding Institute, Cambridge, England, to transfer desirable physiological characteristics of the diploid species of *Triticum*, *Secale* and *Aegilops* to *T. vulgare*. Hexaploid amphidiploids derived from crosses between  $4n$  wheats and diploid species have been employed in crosses with *T. vulgare*, to produce chromosome recombinations or substitutions. Where no homologies exist between the chromosomes of the diploid species and *T. vulgare*,  $8n$  amphidiploids involving these forms have been back-crossed to *T. vulgare* to give  $44$ -chromosome lines in each of which a single pair of alien chromosomes has been added to the full complement of *T. vulgare*; these lines may be used in crosses with monosomics of *T. vulgare* to substitute specific alien chromosomes for specific ones of *T. vulgare*.

- 2920 HÄNSEL, H.  
 Mehrjährige Frühjahrs-Saatzeiten-Versuche mit Winterweizen. Ein Beitrag zur entwicklungsphysiologischen Sortencharakteristik von österreichischen und anderen Winterweizen. (**Several years' spring sowing experiments with winter wheat. A contribution to the developmental and physiological characteristics of Austrian and other winter wheat varieties**).  
*Bodenkultur* 1955 : 8 : 182-94.

Information on varietal differences in rate of growth, lamina length, extent of tillering, number of leaves and ear formation is presented for a large number of Austrian and foreign winter wheats sown at regular intervals from the beginning of March to the end of April at the Probstdorf Seed Nursery, Vienna. These experiments, which were designed to obtain information on photoperiodic and temperature requirements and consequently the suitability of the different varieties for cultivation under

various climatic conditions, indicated that none of the principal Austrian winter wheats was suitable for spring sowing.

- 2921 MEDVEDEVA, G. B.  
**(Multiple fertilization of wheat).**  
*Izv. Akad. Nauk SSSR (News Acad. Sci. USSR)* 1955 : No. 3 : 97-119.  
 [Russian].

This extensive survey of investigations of fertilization processes in wheat gives detailed accounts of many experiments, including those by the present writer, involving Micurinist techniques and the use of pollen mixtures and varied amounts of pollen. The results are discussed from the viewpoint of Lysenko genetics. Data are presented showing that (1) pollination with a large amount of pollen gives progenies with an improved vitality, (2) multiparental crosses may produce progenies combining the characters of two or three parents that had supplied the pollen and (3) some pollination methods (for instance intervarietal open pollination) may improve the vitality of the resulting plants without producing changes in their heritable characters.

- 2922 LUSAK, S. A.  
**(A remarkable form of wheat-rye hybrid).**  
*Priroda (Nature)*, Leningrad 1955 : No. 4 : p. 120. [Russian].

A brief description is given of LV-1, obtained at Veselyi Podol by fertilizing the wheat Lesostepka 75 [Woody Steppe 75] by mixed pollen of the rye Veselopodoljanskaja + self pollen. It combines the ear characters of wheat and rye and is interesting for its long ear, large grain and tall firm straw. It appears to show resistance to smut and rust.

- 2923 MORRISON, J. W.  
**Fertilization and postfertilization development in wheat.**  
*Canad. J. Bot.* 1955 : 33 : 168-76.

By means of combined dissection and squash techniques, observations were made on the fertilization and subsequent development of ovules of *Triticum aestivum* and *Hordeum marinum* x *H. vulgare*. Fusion of the male gamete with the egg cell nucleus was followed by normal mitosis, chromosomes from the male and female nuclei being indistinguishable. The fusion of the two polar nuclei with the second male nucleus and the mitotic division of the resulting triploid nucleus occurred more rapidly than in the embryo, giving rise initially to free

nuclei and subsequently to triploid, cellular endosperm tissue. In the barley hybrid the endosperm began to degenerate about four days after fertilization. It is suggested that the techniques described may be of use in studying seed viability and fertility in hybrids.

2924 JAKUBCINER, M. M.

(**Branched wheat**).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 48-67. [Russian].

A list is given of the botanical varieties of *Triticum turgidum* with branching ears, brief descriptions being provided for each. References to the cultivation of branched wheat in different parts of Russia in ancient and in more modern times are cited and it is concluded that Transcaucasia is its centre of origin.

The majority of forms are spring wheats but data are presented showing that they differ in the length of their vernalization stage. Most of them are not very resistant to frost, drought, high temperatures, *Fusarium* or mildew but many of them are more resistant than the common bread wheats to rust and smut species and to Hessian fly. Most of them have very tall but very strong straw. Descriptions of the high yields of these wheats appearing in the literature have not been fully borne out by the results of tests at the Institute of Plant Industry in the USSR, where in 1929 in Dagestan the yield per plant was 6.4 g. of grain compared with 6.96 g. from the local variety of *T. durum*; the grain is generally large and in consistency is intermediate between hard and bread wheats; estimations by the Institute of Plant Industry in 1949 showed samples grown near Leningrad to have a protein content of 18%.

Branched forms have been found also in *T. polonicum*, *T. durum*, *T. dicoccum*, *T. spelta*, *T. varilovianum* and certain varieties of *T. vulgare*, as well as in barley and rye and species of *Agropyron* and other grasses. A list is given of the local names which are used to designate the branched wheats in different localities.

2925 SHELLENBERGER, J. A., JOHNSON, J. A., LAUDE, H. H., PALMER, D. L. & MILLER, G. D.

**Quality of wheat grown at different locations in Kansas in 1951 and 1952.**  
Circ. Kans. agric. Exp. Sta. 1954 : No. 303 : Pp. 26.

In this account of comparative tests conducted in Kansas, tabulated data are provided on the milling and baking quality of 11 wheats grown at various stations during 1951-52.

2926 MILLER, B. S. & JOHNSON, J. A.

**A review of methods for determining the quality of wheat and flour for breadmaking.**

Tech. Bull. Kans. agric. Exp. Sta. 1954 : No. 76 : Pp. 62.

An account is given of techniques and apparatus which can be used in determining grain, flour and dough quality by chemical and physical methods and by milling and baking tests and which may be suitable as a means of selection in breeding. A list of 250 references is provided.

2927 BRESSON, C. R. & BARMORE, M. A.

**Viscosity vs. protein and ash content of western wheat varieties.**

Cereal Chem. 1955 : 32 : 144-52.

Highly significant positive correlations between flour viscosity and flour protein content have been found in 17 varieties from the Pacific Northwest. Regression lines are linear and form a fan-shaped group with a common or nearly common origin, hard bread wheats having the greatest, soft wheats the least and dual-purpose wheats intermediate slopes. An idealized diagram of viscosity-protein relationships is provided by means of which the regression lines of new varieties may be determined from single protein and viscosity values, thus affording a simple method of assessing quality. The inclusion of data on ash content in the regression equation significantly improved the estimate of viscosity values in 60% of the varieties.

2928 SLOBODČIKOV, D.

(**Strong soft wheats**).

Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955 : No. 3 : p. 24. [Russian].

The most important soft spring and winter varieties used for improving other bread wheats are briefly described. Most of them have been cultivated in Russia for many years. Erythrosperrum 841, obtained by single plant selection at Krasnyĭ Kut, is outstanding for its drought resistance among the spring wheats. Novoukrainka 83 and Novoukrainka 84 are winter wheats that surpass all others in baking quality. They were obtained from Ukrainka x Marquis at Krasnodar.

2929 SIMS, H. J.

**The protein content of wheat varieties grown in standard plots and spaced rows.**

J. Aust. Inst. agric. Sci. 1955 : 21 : 38-39.

Data obtained at Longerenong Agricultural College, Victoria, indicate that the protein content of grain samples from spaced rows is



higher than that of samples from standard plots. The correlation between the protein content of grain from plots and rows was, however, highly significant. Use can therefore be made of spaced rows in selecting for this character.

2930 NEENAN, M.

**Adaptability of wheat varieties to acid soils.**

Nature, Lond. 1955 : 175 : 1090-91.

Experiments at the Johnstown Castle Agricultural College, Wexford, Republic of Ireland, have shown that varieties may respond differently to Al and Mn toxicity.

2931 PETROV, I. P.

**(New varieties of spring wheat from SIBIRIIZHOZ).**

Zemledelie (Agriculture) 1955 : No. 3 : 79-82. [Russian].

Descriptions are given of new wheats obtained at the Siberian Cereal Research Institute by intervarietal or interspecific hybridization. They surpass Milturum 321 in earliness and yield and show resistance to shedding, lodging and smut. Their baking and milling properties are good.

2932 PUGSLEY, A. T.

**Some aspects of backcrossing for disease resistance in cereals.**

J. Aust. Inst. agric. Sci. 1955 : 21 : 16-20.

The author expresses the view that, in order to facilitate back-crossing programmes, especially in wheat, consideration should be given to the establishment of an internationally recognized centre with the responsibility of maintaining type material of known genetic constitution. A more satisfactory system of classification for reaction to physiological races of diseases would thus be inaugurated, the FAO world catalogue of genetic stocks of wheat being criticized for its lack of reference to races in its classification for stem-rust resistance. In addition, confusions arising out of varietal synonymy could be avoided. Two methods of approach to the problem of new races are possible: (1) the accumulation of a number of genes for resistance in a single variety and (2) the development of a number of strains of a given variety, each possessing distinct genes for resistance. In (2) the strains can be released or held in reserve according to the situation.

Back-crossing carried out in Australia to incorporate resistance to stem rust, leaf rust, or bunt in several commercial wheats and to mildew and covered smut in the barleys Prior and Research is then surveyed.

So far the theoretical expectation that the agronomic qualities of the recurrent parent would be recovered has been realized; evaluation of agronomic performance has therefore been unnecessary. Another advantage of the back-crossing technique is the fact that new situations with respect to diseases can be met without interfering with the varieties found to be acceptable by the farmer and industry.

2933 KOVÁCS, A.

**Adatok búzafajtagyűjteményeink betegséggellenállóságához. (Data concerning disease-resistant wheat varieties).**

Növénytermelés 1952 : 1 : 179-88.

Observations on the effect of natural epidemics and the results of inoculation experiments at Sopronhorpács, Hungary, have shown the following varieties to be disease resistant: Democrat, Aniversario, Barletta, Vigo, *Triticum monococcum*, *T. timopheevi* and *T. dicoccum* to *Puccinia triticensis*; Nelred, Oro, *T. timopheevi* and *T. monococcum* to *Tilletia* spp.; and Vigo to *Ustilago tritici*.

2934 ZAHARŽEVSKIĬ, A.

**(A new variety of hard spring wheat, Kubanj 3).**

Zemledelie (Agriculture) 1955 : No. 4 : 106-09. [Russian].

Kubanj 3, selected from a strain from Rostov province, outyields Melanopus 69 and has superseded it as a standard in the northern zone of the Krasnodar territory. A midseason type with good milling and macaroni properties and of fairish baking quality, it is distinguished by large 98% vitreous grain and resistance to loose smut, lodging, drought and spring frost.

2935 SALVAT, B.

**Note préliminaire sur des provenances françaises de charbon du blé. (Preliminary note on French sources of wheat smut).**

Ann. Inst. nat. Rech. agron., Paris 1954 : Sér. B : 4 : 375-84.

Two separate races or race complexes were distinguished at the Central Station of Genetics and Plant Breeding, Versailles, in tests of specimens of *Ustilago tritici* obtained from different wheat-growing areas in France. The one race complex, designated A, infected a number of varieties susceptible to a strain of the pathogen isolated from Vilmorin 27; the other race complex, designated D, caused no serious damage to varieties susceptible to race A but infected a series of other varieties. The presence of the Belgian race isolated from 18-102 was not detected in samples of French origin,

although some of the French varieties tested proved susceptible to it. Certain varieties appeared to exercise a selective influence on the race complex with which they had been infected. Tabulated data on the comparative susceptibility of the varieties tested to isolates of the pathogen obtained from different parts of the country are included.

2936 CENÓZ, H. P.

Resistencia al carbón volador del trigo.  
(Resistance to loose smut in wheat).  
Rev. Invest. agríc. B. Aires 1952 : 6 : 29-88.

Artificial infection of a collection of varieties of *Triticum aestivum* revealed great variations in percentage attack, both from year to year and from variety to variety. Of the wheats now cultivated in Argentina only Sinvalocho MA displayed complete resistance in each of the five years of the experiment; certain others are indicated as having shown less than 1% infection, most of them being descendants of Marquis, Reliance, Klein 49a, 38MA or Barletta. Among the newer varieties Klein Cometa [Comet], Klein Crédito [Credit] and Klein Otto Wulff are mentioned as being resistant, as well as several varieties introduced from abroad. Most varieties of *T. durum* were resistant, as were *T. monococcum*, *T. dicoccum*, *T. polonicum*, *T. macha* and *T. timopheevi*, whereas *T. sphaerococcum* and *T. turgidum* were susceptible, when tested with the same population of the parasite as was used for *T. aestivum*; there are however indications that other races may exist which are capable of attacking *T. durum*. Some varieties of *T. aestivum* reported as susceptible in the USA proved resistant to the Argentine population used in these tests.

2937 PODHRADSKY, J.

Ellenállósági és biotípus-kísérletek a búza-köszög *Tilletia foetida* (Wallr.) Liro és *Tilletia triticoidea* Savul. fajaival. [Resistance and biotype tests with the wheat smuts *T. foetida* (Wallr.) and *T. triticoidea* Savul].  
Növénytermelés 1952 : 1 : 93-102.

Numerous Hungarian varieties were tested for resistance to samples of the above two pathogens drawn from various regions of Hungary. No variety was resistant to either pathogen though some differences were noted in degree of susceptibility. Both fungus species showed biotypic differentiation in respect of virulence towards the varieties investigated.

2938 TYLER, L. J. & JENSEN, N. F.  
Dwarf bunt of winter wheat.  
Fm. Res. 1955 : 21 : No. 2 : p. 5.

At the Cornell University Agricultural Experiment Station, Ithaca, NY, preliminary screening of newly bred lines for resistance to dwarf bunt involves the use of a race of common bunt, resistance to which appears to be controlled by factors closely similar to or the same as those governing dwarf bunt resistance.

2939 SCHALLER, C. W. & BRIGGS, F. N.  
Linkage relationships of the Martin, Hussar, Turkey, and Rio genes for bunt resistance in wheat.  
Agron. J. 1955 : 47 : 181-86.

The resistance of Calif. 3028 and Calif. 3029 to race T-1 of bunt (*Tilletia caries*) has been found to depend upon the gene *M*.

The author and his colleagues have identified seven genes, each of which determines resistance to race T-1. Four of these genes, *M*, *R*, *X* and *T*, have previously been found to be linked. Evidence is now presented which establishes linkage between *M* and *H*, another of the seven genes for resistance. On the basis of an analysis of all the available data, the gene order *H-M-R-T* is suggested, with recombination values of  $37.2 \pm 4.2$ ,  $29.3 \pm 3.1$  and  $15.2 \pm 1.6\%$  between *H* and *M*, *M* and *R* and *R* and *T* respectively. No further information has been obtained on the linkage relationships of *X*.

2940 Eleventh Annual Report of the Winter Wheat Improvement in Ontario, 1953 (1954) : Pp. 27. (Mimeographed).

Twelfth Annual Report of the Winter Wheat Improvement in Ontario, 1954 (1955) : Pp. 22. (Mimeographed).

Breeding for resistance to dwarf bunt at Ontario Agricultural College has so far involved crossing Genesee with 10 other varieties. Preliminary trials at the Central Experimental Farm, Ottawa, have indicated that resistance to this pathogen shows simple Mendelian inheritance. The cross 4719 (Rex-Oro 12421 x Cornell 595)  $F_1$  x Cornell 595 shows promise in respect of dwarf bunt resistance and agronomic characters. Other breeding objectives are rust resistance and winter hardiness.

Regional trials of a number of varieties and hybrids have been carried out; results are given in tables showing the yield, straw strength, grain colour and weight, quality and resistance to rusts, loose smut and bunt.



- 2941 FADRHONS, J.  
Šlechtění pšenice na odolnost proti sněti  
mazlavé. (**Breeding wheat for resist-  
ance to stinking smut**).

Sborn. čsl. Acad. zeměd. 1955 : 28 : 1-10.

At Semčice, initial material for breeding wheats showing resistance to diseases, notably to *Tilletia*, has been selected on the basis of artificial infection trials. The spring wheat Hope proved immune from bunt and showed varied degrees of resistance to loose smut, rusts and *Erysiphe*. It is regarded as suitable for imparting resistance to most standards. Wheat-*Agropyron* hybrid 599 was outstanding in resistance to bunt among the winter wheats. It will be used for crossing with the susceptible alternative varieties such as Česká Přesívka [Czech Alternative], Chlumecká 12 and Kaštická. The resulting hybrids will then be crossed with Pyselka for the improvement of yield and resistance to lodging.

- 2942 BASILE, R., LEONORI-OSSICINI, A. & ROSA, M.  
Identificazione di razze fisiologiche di  
*Puccinia triticea* Erikss. in Italia.  
(**Identification of physiological races  
of *P. triticea* Erikss. in Italy**).  
Ann. Sper. agr. 1955 : 9 : No. 3 : Suppl. :  
li-lviii.

The studies reported have shown a complete change in the racial composition of *P. triticea* in Italy since 1943; race 98, reported for the first time in Italy, proved to be fairly prevalent, races 63 and 111 are reported for the first time in Europe and certain others seem to be entirely new and are given provisional symbols.

- 2943 VALLEGA, J.  
**Wheat rust races in South America.**  
Phytopathology 1955 : 45 : 242-46.

The races of *Puccinia graminis* f.sp. *tritici*, *P. triticea* and *P. glumarum* which have been found in South America are listed and their areas of distribution indicated. Since the capacity to develop new genetic forms appears to be widespread in the rusts, even where no sexual stages occur, it is suggested that mutation is more common than has hitherto been supposed or that some other genetic mechanisms play a part in causing variability.

- 2944 VOLOSKY DE HERNÁNDEZ, D.  
Estudios preliminares sobre el *Puccinia  
glumarum* (Schm. Erikss) del trigo en Chile.  
[**Preliminary studies of *P. glumarum*  
(Schm. Erikss.) of wheat in Chile**].  
Agricultura téc., Santiago 1953 : 13 :  
159-65.

The results of a study of 70 samples of the rust

collected in various parts of Chile suggest the existence of some races not previously described.

- 2945 JOHNSON, T.  
**Reactions of Selkirk to stem rust  
races.**

Cereal News 1955 : 2 : No. 2 : 6-7.

The wheat variety Selkirk has been found to be susceptible to races 15B-3 and 29A and to a race that on the basis of its reactions on differential hosts may be regarded as race 12 or 32. Its resistance to races 48A and 139 is thought to derive from its parent Redman.

- 2946 KNOTT, D. R.  
**Wheat stem rust in Western Canada.**  
Field Husb. Circ. Saskatch. 1954 : No.  
562 : Pp. 4. (Mimeographed).

A brief survey of early work on wheat breeding for stem-rust resistance in the USA and Canada is followed by an outline of breeding for resistance to race 15B in the last few years. Selkirk, the first variety combining resistance to race 15B with good yield and quality, has been distributed in Canada (cf. *PBA*, Vol. XXIV, Abst. 1786); another 15B-resistant variety, Willet, has been developed at the University of Minnesota (cf. Abst. 237). Two new forms of 15B have, however, already appeared which are capable of attacking Selkirk. The Kenya variety K338 AC 2 E 2 has so far proved to be resistant to all races of rust; a Thatcher type with 15B resistance derived from this wheat is shortly to be tested in Canada. Research on the nature of stem-rust resistance and the inheritance of this character is in progress at the University of Saskatchewan.

- 2947 VILLANUEVA NOVOA, R.  
Ensayos uniformes con trigos híbridos.  
(**Uniform tests with hybrid wheats**).  
Bol. trimestr. Exp. agropec., Progr.  
Coop. Exp. Agropec., Lima 1954 : 3 :  
No. 3 : 16-19.

Observations were made in different localities of Peru on 99 lines of  $F_6$ - $F_{11}$  wheat hybrids selected for resistance to *Puccinia graminis* var. *tritici*. The lowest degree of resistance was found in tests at La Cueva in the northern Sierra, where race 15B-2P is present, possibly together with other as yet unidentified races.

- 2948 SILVA, A. R. DA  
**Breeding for stem and leaf rust resis-  
tance in wheat in Brazil; including  
basic genetical studies and a survey  
of the physiological races of rust.**  
Diss. Abstr. 1955:15: Publ. No. 11,080:  
p. 322.

Of several hundred varieties and lines tested

during 1950–53 in Brazil, 24 were resistant to stem-rust races 11, 15 and 17, which were identified in a survey in Brazil, and also to race 42. In crosses involving Kenya 58, Red Egyptian, (111<sup>1</sup> x Chinese) Timopheevi and Egyptian NA101, seedling and adult stem-rust resistance was in some cases dominant and in others recessive; resistance appeared to be conditioned by one or two factors.

Twenty-six leaf-rust races have been found in Brazil, races 144–150 being newly reported. Frontana, Rio Negro and Trapeano were among the varieties with the greatest leaf rust resistance in the field; in tests with 12 races at the seedling stage, Frontana, Rio Negro, Centeioz, Bagé and Trapeano displayed resistance to a number of races. In crosses between Bagé, Frontana and Rio Negro, resistance to races 31 and 77 appeared to be determined by one, two or three factors.

Several promising lines have been obtained from crosses involving the stem-rust resistant varieties Kenya 58, Red Egyptian and Timstein and the adapted, leaf-rust resistant varieties Frontana, Fronteira and Rio Negro. Sinvaloch is being used in the hybridization programme as a source of leaf-rust resistance, earliness and good baking quality.

- 2949 VINCENT, A., POCHARD, E. & GIGNOUX, J. Comportement aux stades plantule et adulte vis-à-vis d'une race physiologique de rouille noire, des descendance d'un géniteur résistant (*Triticum vulgare*). [Behaviour at the seedling and adult plant stages of the progeny of a resistant parent (*T. vulgare*) towards a physiological race of black rust]. Ann. Inst. nat. Rech. agron., Paris 1954 : Sér. B : 4 : 353–74.

Crosses effected at the Central Station of Genetics and Plant Breeding, Versailles, between line 80, resistant at both the seedling and mature plant stages to race 21 of *Puccinia graminis*, and three other varieties that are susceptible at the seedling stage but display varying degrees of resistance at the mature plant stage, indicated that resistance was dependent upon the interaction of two genes, designated  $R_1$  and  $R_2$ , situated at different loci. At the seedling plant stage,  $R_1$  is epistatic to  $R_2$ ; in the adult plants the two genes have a cumulative effect.  $F_2$  and  $F_3$  segregates showed that  $R_1$  was inherited as a dominant character, while  $R_2$  proved to be incompletely dominant. Genotypes of the constitution  $R_1R_1R_2R_2$  and  $R_1R_1r_2r_2$  were both highly resistant at the seedling stage but the

combination  $R_1R_1R_2R_2$  conferred a slightly higher type of resistance than  $R_1R_1r_2r_2$  in the adult plants. Plants with  $r_1r_1R_2R_2$  were slightly susceptible at the seedling stage and a little more so at the adult plant stage, thus suggesting that  $R_1$  exercises more influence on resistance than does  $R_2$ . The presence of the allelomorphous genes  $r_1$  and  $r_2$  in conjunction with  $R_1$  or  $R_2$  respectively resulted in varying degrees of susceptibility and explains differences in behaviour between crosses in which line 80 is one of the parents.

- 2950 AYAD, M. A. G. [AYAD, M. 'A. UL GH.] Inheritance of field reaction to stem rust and some other characters in wheat.

Alexandria J. agric. Res. 1953 : 1 : 74–80.

Hybrids of the stem-rust resistant variety Giza 141 with the resistant wheats NA710 and NA711 and the moderately susceptible wheats Gabo and line 950 were tested for field reaction to a mixture of the prevalent stem rust races at the Plant Breeding Section, Giza, Egypt, during 1955–53. In the crosses Giza 141 x NA710 and Giza 141 x NA711, reaction was governed by two independent gene pairs, resistance being expressed in the presence of either or both of the dominant factors, while in Giza 141 x line 950 resistance was controlled by a single dominant gene. In Giza 141 x Gabo, susceptibility was dominant and monogenically controlled. Glume colour, awn length and waxiness were each monogenically determined and were inherited independently of each other and of stem rust reaction, except in the case of glume colour and waxiness, which were associated.

- 2951 GREEN, G. J. & JOHNSON, T.

Specificity in the effect of high temperature on the adult plant reaction of wheat varieties to races of stem rust.

Canad. J. Bot. 1955 : 33 : 197–201.

Particulars are given of the reactions of adult plants of ten wheats to races 11, 12, 15A, 15B, 15B–1, 15B–2, 15B–3, 17A, 29, 29A and 139 of stem rust at temperatures of about 60° and 80° F. The varieties K338AC2.E.2 and K117A were resistant to all races at both temperatures and Redman to all races except the 15B strains. While Redman was slightly less resistant to race 12 at the low than at the high temperature, the other wheats generally showed increased susceptibility at the high temperature to races to which they were resistant at the low temperature.



2952 PETERSON, R. F.

**A wheat breeding nursery in Mexico.**

Cereal News 1955 : 2 : No. 2 : 4-5.

A nursery for growing  $F_2$ ,  $F_3$  and  $F_4$  generations of Canadian spring wheat hybrids under conditions of rust infection during winter months has been established near Ciudad Obregón, Mexico, with the aim of increasing the number of generations that can be bred in one year.

2953 MHITARJAN, M. A.

**(Ways of producing wheat varieties resistant to rust).**

Agrobiologija (Agrobiology) 1955 : No. 1 : 100-06. [Russian].

This account of breeding work on wheats in Armenia gives descriptions of two new rust-resistant varieties. Martuk is a winter wheat selected from a local strain of Ukrainka whose inheritance had been shattered by sowing at an unusual time in a mountainous region. It outyields the standards Ukrainka and Erynaceum by 2-4.2 c. per ha. Ozjar is a lodging-resistant spring wheat producing double the amount of grain of Erynaceum. It was obtained by training the winter wheat Altiagadz for the spring habit, using immature grains.

2954 HARRIS, R. H., SIBBITT, L. D. & SCOTT, G. M.

**Quality of some new rust resistant bread wheat hybrids.**

Bi-m. Bull. N. Dak. agric. Exp. Sta. 1955 : 17 : 131-37.

Tests were carried out on the milling, baking and dough properties of Selkirk, Lee, Thatcher, Rushmore and the experimental hybrid selections ND1, ND2, ND3, 3880-127 and 3880-227. With the exception of 3880-127, these selections showed good overall quality and are to be further tested.

2955 LUPTON, F. G. H. & MACER, R. C. F.

**Winter wheats resistant to eyespot.**

Agriculture, Lond. 1955 : 62 : 54-56.

Of the four varieties Cappelle Desprez, Bersée, Squarehead's Master and Yeoman, tested at Cambridge in 1953-4, the first-named showed less infection and less decrease in yield than the other varieties when exposed to attack by *Cercospora herpotrichoides*.

2956 BATTS, C. C. V. & FIDDIAN, W. E. H.

**Effect of previous cropping on eyespot in four varieties of winter wheat.**

Plant Path. 1955 : 4 : 25-28.

A trial of Bersée, Hybrid 46, Capelle Desprez and Juliana at the Norfolk Agricultural Station,

Sprowston, England, indicated that true differences in varietal resistance to eyespot (*Cercospora herpotrichoides*) exist, Capelle Desprez being the most resistant variety.

2957 Greenbug resistant wheat.

Sth. Seedsman 1955 : 18 : No. 2 : p. 90.

At the Oklahoma Agricultural Experiment Station, resistance to *Toxoptera graminum* is being transferred from an unnamed variety, thought to be a durum wheat, to locally adapted varieties of good quality.

## BUCKWHEAT

2958 SOLITERMAN, P. V.

**(Scientific research work on buckwheat should be improved).**

Zemledelie (Agriculture) 1955 : No. 3 : 120-22. [Russian].

References are made to modern breeding trends in the RSFSR and to new high-yielding strains developed at various institutes, notably some large-grained vegetative hybrids from the Aleksandrovskaia breeding station. These hybrids were obtained by grafting normal diploid varieties on to tetraploid stocks.

2959 ŽEBRAK, A. R. & ŽEBRAK, E. A.

**(Variability of intervarietal amphidiploids of buckwheat).**

Bot. Ž. (Bot. J.), Moskva 1955 : 40 : 189-99. [Russian].

A description of the work on the development of tetraploid buckwheats, which began in 1944 and was resumed in 1950, after an interval of two years when studies on polyploidy went into abeyance, is presented.

A tetraploid form of the early-maturing White Russian buckwheat Terehovskaja, obtained by the use of colchicine, was fertilized by the pollen of a number of other tetraploids produced by the same method. The tetraploids, now in the sixth generation, outyield other varieties of buckwheat in White Russia and are regarded as promising breeding material on account of their great variability in most morphological and biological characters; many families are distinguished by a high degree of fertility and large grain.

2960 TATEBE, T.

**(Physiological studies on fertility in buckwheat. IV. On the mechanism of heterostylism in short-styled flowers).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 127-31. [Japanese].

Tests with iodine solution two hours after

illegitimate pollination of short-styled flowers showed that many of the pollen grains still contained starch. In legitimate combinations and illegitimate fertilization of long-styled plants, much less starch remained after pollination. It is assumed that the starch content of the pollen grains of short-styled plants is higher than in long-styled plants and that the styles of short-styled plants contain less amylolytic enzyme.

A few self-fertile short-styled plants were discovered; in these, far less starch remained in the pollen grains after self fertilization than in the normal self-sterile short-styled plants.

2961 MODILEVSKIĬ, JA. S.

[**Inheritance of flower shape in cultivated buckwheat (*Fagopyrum sagittatum* Gilib.)**].

Bot. Ž. (Bot. J.), Kiiŭ 1954 : 11 : No. 1 : 78-84. [Ukrainian].

The percentage of short-styled plants in the offspring of illegitimately-pollinated buckwheat was increased when the plants were sprayed with boron before the flowers opened, while the grains were setting and after they had set. The number of short-styled plants from short-styled x long-styled hybrids was more than doubled and in the offspring of the reciprocal cross it was nine times greater than in the controls.

## OATS

2962 STEVENS, H.

**Overland oats.**

Circ. Idaho agric. Exp. Sta. 1953 : No. 126 : unpaginated.

Developed at the Idaho Agricultural Experiment Station from the cross (Victoria-Richland) x Bannock, the white-grained variety Overland has short, strong straw, shows resistance to crown rust races 45 and 57 and to all races of smut except one, and equals Victoria in yield.

2963 WALLACE, A. T., MIDDLETON, G. K., COMSTOCK, R. E. & ROBINSON, H. F.

**Variability in Letoria and Fulwin oats.**

Agron. J. 1955 : 47 : 178-81.

A study was made of the variability among 15 parent plants of Letoria [Lee x Victoria (*Avena sativa*)], 15 parent plants of Fulwin [selections of Fulghum (*A. byzantina*)] and among the  $F_2$  populations obtained by intervarietal crossing of these parents in pairs, the characters investigated being yield, height, culm number, seed number, weight per seed and seed number per panicle. The plants of Fulwin showed varia-

bility in all these characters except the sixth. Variability among the Letoria parents was not significant for any of the characters. Significant differences were detected between the  $F_2$  populations, except with respect to yield. Assuming that heterosis was expressed when the progeny mean exceeded the parental average, the  $F_2$  crosses exhibited heterosis for all six characters. Genotypic variance was estimated by (1) the difference between  $F_2$  variance and the mean of the parent variances and (2) by the same difference but with the mean of the parent variances adjusted to the  $F_2$  means on the assumption of a linear relationship between means and environmental variances. Estimates obtained by the second method suggested considerable genotypic variance in  $F_2$  yield and seed number per panicle but little if any in the other four characters. The expression of heterosis in all six characters, however, indicated that the parents differed genotypically in all the traits studied.

2964 STANTON, T. R.

**Oat identification and classification.**

Tech. Bull. US Dep. Agric. 1955 : No. 1100 : Pp. 206.

A detailed analysis of the taxonomic features of the oat plant is followed by a classification of the species, subspecies and agricultural varieties of oats, together with identification keys. The varieties described are those cultivated in the United States, information being provided not only on their botanical characters but also their history, distribution and synonymy.

2965 TESSI, J. L.

Razas de distinto poder patógeno dentro de "*Pseudomonas striafaciens*" en Argentina y reacción de variedades de avena a su ataque. (**Races of different pathogenicity within *Ps. striafaciens* in Argentina and the reaction of oats to their attack**).

Rev. Invest. agríc. B. Aires 1952 : 6 : 235-46.

The disease produced by *Ps. striafaciens* in Argentina proved to be the same as the stripe blight of the USA. A large collection of oat varieties was subjected to artificial inoculation; all those which proved resistant were varieties also known to be resistant to *Ps. coronafaciens*, most of the oats cultivated in Argentina falling into the resistant class. Some varieties gave different reactions according to the isolate of *Ps. striafaciens* used and at least three races of this species are shown to exist. The oats thought most promising for use as resistant



parents are Fulghum CI 708, Klein Mar [Sea] and Kanota CI839.

2966 ROSEN, H. R.

**New germ plasm for combined resistance to *Helminthosporium* blight and crown rust of oats.**

Phytopathology 1955 : 45 : 219-21.

A number of oat selections derived from a mutant of Tennessee 1922 x Bond-Iogold show immunity from races 45, 57 and 101 of crown rust at 60° F. but complete susceptibility at 70°-76° F. They are very winter-hardy under conditions in Arkansas and are also resistant to *Helminthosporium* blight, red spot mosaic and yellow dwarf virus.

2967 GRIFFITHS, D. J.

**Distribution of genes for disease resistance in the genus *Avena*.**

Heredity 1955 : 9 : p. 149. (Abst.).

When tested for reaction to physiological races of crown rust (*Puccinia coronata* var. *avenae*) and mildew (*Erysiphe graminis* var. *avenae*) at the Welsh Plant Breeding Station, Aberystwyth, none of the varieties of *Avena sativa* commonly grown in Britain displayed resistance. Forms of *A. byzantina*, *A. ludoviciana*, *A. sterilis* and *A. strigosa*, however, exhibited resistance. Absence of genes for resistance is attributed to the effect of choice of parental material regardless of reaction to the two diseases and to the narrow genetic basis upon which the varieties have been developed. Little or no selection has been applied to land races of *A. strigosa* and they show considerable heterogeneity in respect of morphological and physiological characters.

2968 SIMONS, M. D.

**Adult plant resistance to crown rust of certain oat selections.**

Phytopathology 1955 : 45 : 275-78.

Of a number of lines which showed adult field resistance at Ames, Iowa, in 1953, several proved susceptible the following year. Selections whose upper leaves at the heading stage were resistant under greenhouse conditions were also resistant in the field, but where only the lower leaves were resistant, field reaction varied in different lines. The three most resistant selections were the PI strains 174544, 174545 and 185783.

2969 Cereals news from other countries.

Cereal News 1955 : 2 : No. 2 : 19-20.

It is noted that the stem-rust resistances of the oat varieties Richland, White Russian and Hajira-Joanette have been combined in a single variety developed at the University of Minnesota from the multiple crosses [Landhafer x (Mindo

x Hajira-Joanette)] x Andrew and [Landhafer x (Bond-Rainbow x Hajira-Joanette)] x Clinton. The variety Minland, developed at the same station from Landhafer x (Mindo x Hajira-Joanette), is resistant to all races of crown rust prevalent in the USA. It is also resistant to loose and covered smut and, at moderate temperatures, to all races of stem rust except 7a.

2970 Rodney oat is resistant to two stem rusts, open to attack by another.

What's New Crops Soils 1954 : 7 : p. 24.

A new race of stem rust, 7-A, has caused damage in the Canadian variety Rodney, recently introduced into Minnesota (cf. Abst. 1711).

2971 ROBERTSON, D.

**Stem eelworm of oats.**

Scot. Agric. 1955 : 34 : 209-12.

It is noted that in experiments conducted in Scotland over a period of two years the oat variety Milford has shown complete resistance to *Ditylenchus dipsaci*.

## RYE

2972 NAKAJIMA, G.

**(Cytogenetical studies of interspecific hybrids of *Secale*. I. The results of hybridization and the external morphology of the F<sub>1</sub> plants).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 132-34. [Japanese].

Descriptions are given of the external morphology of hybrids from all combinations of the species *S. cereale*, *S. vavilovi*, *S. africanum* and *S. montanum*. The closest affinities appeared to exist between *S. cereale* and *S. vavilovi*, on the one hand, and *S. africanum* and *S. montanum*, on the other.

2973 PRICE, S.

**Induction of additional hybrid sterility in *S. cereale* x *montanum* by irradiation of pollen.**

Science 1955 : 121 : 625-26. (Abst.).

F<sub>1</sub> hybrids of *Secale cereale* x *S. montanum* display considerable variability in pollen fertility and seed set. Hybrids (r-hybrids) produced by using X-irradiated pollen and control hybrids were compared with respect to meiotic irregularities and degree of pollen sterility. The controls were heterozygous for two reciprocal translocations, the modal chromosome association observed being 4<sub>II</sub> and 1<sub>IV</sub>. Inversion bridges occurred but not in greater frequencies than in the parental species. Of the 26 r-hybrids examined, 17 contained additional induced translocations; inversions were also

induced in several plants. In the controls, pollen fertility and seed set varied independently, neither being correlated with detectable chromosome aberrations; their variability in pollen fertility is therefore regarded as largely genic in origin. In the r-hybrids, pollen fertility and seed set were weakly correlated but neither was correlated with chromosome irregularities. The increased sterility of the r-hybrids is believed to be due to cryptic structural changes in the chromosomes rather than to point mutations.

2974 REES, H.

**Genotypic control of chromosome behaviour in rye. 1. Inbred lines.**

Heredity 1955 : 9 : 93-116.

Investigations carried out at the Department of Genetics, University of Birmingham, on pollen meiosis in inbred lines showed that the lines differed with respect to the frequency, terminalization and localization of chiasmata, neocentric activity, disturbance in premeiotic mitosis and chromosome breakage at prophase I. Such variation is indicative of genotype control of the nuclear phenotype. It is suggested that chiasma frequency and terminalization are polygenically determined. Two sublines of a line which had been inbred by selfing for over 20 generations displayed differences in frequency of terminalized chiasmata and other chromosomal characters; this divergence is attributed to residual heterozygosity of the parent line resulting from genic mutation and intense selection of homozygotes. Premeiotic irregularity studied in detail in one inbred line, affected approximately 1% of the pollen mother cells. The abnormal cells each contained a micronucleus, or occasionally a complete nucleus. The chromosomes of the micronuclei were frequently broken; their development was retarded at prophase I, division being accelerated at the end of this stage. The chromosomes in the micronuclei were also characterized by a reduced chiasma frequency. Variation between PMC nuclei within a single anther is the result of local environmental variations acting through the medium of the cytoplasm, threshold-type reactions in the cytoplasm causing differentiation into normal and abnormal nuclei.

2975 NAKAJIMA, G.

**(A rye with  $2n = 19$  chromosomes).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 149-52. [Japanese].

A description is given of the morphology and cytology of a 19-chromosome rye obtained from

a  $4n \times 2n$  cross. The 19-chromosome form was highly sterile. The modal meiotic configuration was  $9_{II} + 1_I$  an occasional trivalent was also observed.

2976 NAKAJIMA, G.

**(A rye with  $2n = 27$  chromosomes and its progenies).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 153-57. [Japanese].

A description is given of the morphology and cytology of a 27-chromosome plant observed in a population of colchicine-induced  $4n$  rye. At meiosis, 12-13 bivalents were formed. The chromosome numbers of the offspring ranged from 26 to 29; fertility was low.

It is suggested that a hypoaototetraploid plant should be designated as a monotrismoauto-tetraploid if one chromosome is missing, a ditrisomoautotetraploid if two chromosomes are missing, and so on.

2977 SZENTIVÁNY, A.

Formy a vlastnosti vetevnatých klasov raži zošľachťovanej na vetevnatosť. (Forms and properties of branched ears of rye bred for branching).

Pôdohospodárstvo 1954 : 1 : 348-63.

On the basis of experiments that have been performed since 1950 at the Breeding Station of Velká Lomnice, Czechoslovakia, it was established that the branching of rye ears depends both on external conditions and on the seed stock used. Profuse branching is correlated with shorter and stronger straw. Under optimum field conditions some strains gave 100% branched ears. The strains selected for branching are resistant to rust and winter hardy; they yield well and breed true.

2978 LEKČINSKAJA, JA. & VIONCEK, JA. I.

**(Conditions promoting the formation of branched ears in rye).**

Agrobiologija (Agrobiology) 1955 : No. 2 : 78-82. [Russian].

In Poland, a number of rye strains developed the branching habit and showed various other morphological changes when grown upon rich soil and given photoperiods of 10 hr. for 25 days at the tillering stage. In the following year the seed from the branching and normal ears was again grown in soil providing good nourishment, but the photoperiodic treatments were modified. In one experiment the plants were grown under normal days, in others under photoperiods of 10 hr. for 15, 25 and 30 days. In the case of plants given a normal day only a few ears showed an inclination to branch; they were borne on plants raised from the seed from ears



that were branched in the previous year. In the experiment where the plants were given 10 hr. photoperiods for 15 days a considerable number of branching ears occurred, but only in the offspring from plants with branching ears. In the experiment where the photoperiodic treatment was given for 25 days all plants displayed the branching habit. Numerous morphological changes occurred, besides the development of branching ears, when the photoperiodic treatment lasted 30 days.

## MAIZE

- 2979 BRANDOLINI, A.  
Contributo allo studio delle varietà italiane di mais. Il granoturco "Rostrato" (*Zea mays* L. cv. "Rostrata"). Parte I. [A contribution to the study of Italian varieties of maize. The maize Rostrato (*Z. mays* L. cv. 'Rostrata'). Pt. I].  
Ann. Sper. agr. 1955 : 9 : No. 2 : Suppl. : lxxi-xcv.

The advantage of using Italian selfed strains or crosses of Italian and foreign strains in the maize breeding programme in Italy has been recognized, and the present paper is the first contribution to the necessary survey of the indigenous varieties of that country.

The cultivar Rostrato is described from the following aspects: origin, botanical classification and characteristics, including tabulated biometric data relating to the various parts of the plant; chemical composition of the grain; geographical distribution; resistance to diseases and pests; vegetation period, fertility and other economic characteristics, as compared with various Italian and foreign varieties; and the relation between leaf number and the length of the vegetative period.

The grain yield per plant proved superior to all other varieties except Silvermine; the low water content of the kernels resulted in a commercial product of high quality.

- 2980 BRANDOLINI, A.  
Contributo allo studio delle varietà italiane di mais. Il granoturco "Rostrato" (*Zea mays* L. cv. "Rostrata"). Parte II. [Contribution to the study of the Italian varieties of maize. Rostrato (*Z. mays* L. cv. 'Rostrato') Pt. II.].  
Ann. Sper. agr. 1955 : 9 : No. 3 : Suppl. : cxlix-clxix.

In continuation of earlier observations (cf. Abst.

2979), a full phenological study of the Italian flint variety Rostrato showed that whereas in the plains it is surpassed by newer dent varieties and hybrids, it is still the most suitable maize for high ground in certain areas where the summer temperatures are low and humidity is high. It is pointed out that the flint hybrid Insubria 2201 has exceeded Rostrato slightly in yield and attention should be directed towards producing other hybrids of this type.

- 2981 The First Central American Meeting for Corn Improvement was held at Turrialba.

Inform. Bull. Inter-Amer. Inst. agric. Sci. 1954 : Nos. 66-67-68 : p. 1.

The above meeting, held in October 1954 at the Inter-American Institute of Agricultural Science, Turrialba, Costa Rica, was attended by 49 representatives of the Central American countries. The main objectives of the meeting and the resolutions adopted are noted.

- 2982 COE, E. H. (JUN.)  
Anthocyanin synthesis in maize: genetic and biochemical effects of the factors  $A_1$ ,  $A_2$ , and  $B_z$ .

Diss. Abstr. 1955 : 15 : Publ. No. 10,460 : 14-15.

Investigation of the aleurone and plant tissue of genotypes involving  $A_1$ ,  $A_2$  and  $B_z$  for anthocyanin production has shown that, regardless of the alleles present at the loci  $A_2$  and  $B_z$ ,  $a_1a_1$  individuals are phenotypically similar in pigmentation, according to examination by several different methods. The genotype  $A_1A_2a_2bz bz$ , however, by some criteria is phenotypically similar to  $A_1A_1a_2B_zB_z$  but according to other methods of analysis may resemble  $A_1A_1A_2A_2bz bz$ , or differ from either of the two last-mentioned genotypes. It is suggested that  $A_1$  is the first gene to act in a sequence of reactions leading to anthocyanin production,  $B_z$  probably being the second to come into effect and  $A_2$  the third. Plants with  $A_1a_1$  possess a chemical phenotype intermediate between those with  $A_1A_1$  and  $a_1a_1$ , particularly with respect to the amount of isoquercitrin-like material in the husks. A small amount of isoquercitrin is present in the husks of  $A_1A_1a_2B_zB_z$  plants but none has been detected in  $A_1A_1A_2A_2bz bz$  husks. Isoquercitrin is apparently not produced in the normal synthesis of anthocyanin but arises from a precursor which it has in common with anthocyanin. The presence of an unstable precursor of anthocyanin, probably an aglycone, was detected in

the aleurone of  $A_1A_1a_2a_2BzBz$  kernels. This precursor was convertible into anthocyanin *in vitro* by heating a weakly acidic extract. All the known genetically determined types of acyanic kernel accumulate substances which can be converted into anthocyanin by hot concentrated HCl.

- 2983 EMELJANOV, I.  
**(Hybrid seed, an intensive means of increasing yielding ability).**  
 Socialist. Seljsk. Hozjaistvo (Socialist. Agric.), Moscow 1955 : No. 3 : 74-82. [Russian].

The previous account of high-yielding maize hybrids, referred to in *PBA*, Vol. XXV, Abst. 270, has been amplified by some additional data, the present article mentioning some varieties suitable for cultivation in central and northern Russia. Moscow 3, Moscow 5 and Tula 9 are of recent origin; they have a short growth period and produce more grain under the climatic conditions of Moscow and Tula than Bezenčuk 41, Voronež 76 and other early-maturing varieties.

- 2984 VORKAČEV, G.  
**(The reserves for grain production in the Altai).**  
 Socialist. Seljsk. Hozjaistvo (Socialist. Agric.), Moscow 1955 : No. 3 : 83-88. [Russian].

Ways and means of improving the production of cereals, among others by expanding maize cultivation, are discussed. Mention is made of adapted maize hybrids which produce good yields of grain and green substance in hilly districts and a cultivated variety giving good yields of grain in the steppe. However, the low stature and thin foliage of the latter reduce its yield of green matter, a shortcoming which it is hoped to overcome by crossing it with tall southern varieties.

- 2985 MARIĆ, M.  
**(A study of heterosis for yield in intervarietal crosses of maize).**  
 Zborn. Rad. poljoprivred. Fak./Rev. Res. Wk. Fac. Agric. 1954 : 2 : No. 2 : 196-205. [Serbian].

The results of trials of certain dent x flint, flint x dent, flint x flint and dent x dent hybrids bred at Zemun are presented. All crosses between yellow-grained varieties and most combinations of white x white were more productive than the high yielding parent, but their yields, with the exception of a yellow dent x

yellow flint hybrid, were below that of the local standard.

- 2986 REYES C., P., WORTMAN, L. S. & WELLHAUSEN, E. J.  
 Maíz híbrido para tierra caliente. Rocamex H-501, H-502 y H-503. **(Hybrid maize for hot country. Rocamex H-501, H-502 and H-503).**  
 Foll. Divulg. Secretaría Agric. Ganad., Méx. 1955 : No. 18 : Pp. 38.

Several improved open-pollinated varieties have given good performances in the coastal regions of Mexico but some of the new hybrids, of which three are described, yield between 20 and 30% more grain in the localities and under the conditions to which they are adapted. H-501 is suitable for irrigated land between 0 and 1000 m. above sea level; it is a dent or semident double hybrid, formed from a hybrid of two inbred lines from the late-maturing local varieties Veracruz 15 and Veracruz 39, crossed with a hybrid from two inbreds from the late-maturing northern variety Coahuila 8. It is somewhat earlier than V-520C, and has yielded up to 6418 kg. of grain per ha. under good conditions. The hybrid is less prone to ear rot than the native varieties, lodges less and suffers less from short periods of drought; the ears are well covered by the husks.

H-502 is a dent hybrid suitable for irrigated land in arid and semitropical areas; three of the lines in its parentage are the same as in H-501, the second Coahuila inbred being replaced by SLP2B-34A-3-1. In the north of Mexico it has given yields of up to 8024 kg. of grain per ha., having exceeded the local variety San Juan by 59%. It is resistant to lodging and drought and much less susceptible to *Helminthosporium* sp. than H-501; its ears are somewhat less regular.

H-503 is a vigorous hybrid resistant to lodging and *Helminthosporium* sp.; it ripens some 8 days later than H-501 and is less resistant to drought. Two of its parent lines are the same as in H-501 and H-502, the other two being respectively Ver.39-32A-3-4 and SLP20-26A-3-1, the former medium and the latter late in maturity, both being resistant to *Helminthosporium*. The hybrid is suitable for tropical areas of high fertility and with abundant moisture, where it yields better than H-501 and is less prone to leaf diseases. In the Nayarit area it yielded 3752 kg. of grain per ha. in 1953, compared with 3706 kg. from H-501 and 2486 kg. from the local variety Jazmín.

Under conditions of low soil fertility the hybrids



do not usually yield much more than the open-pollinated varieties.

2987 **Maíz híbrido para el Bajío y regiones similares. (Hybrid maize for the Bajío and similar regions).**

Foll. Divulg. Secretaría Agric. Ganad., Méx. 1955 : No. 19 : Pp. 35.

Observations on the local maize varieties of Mexico (cf. *PBA*, Vol. XXIV, Abst. 1926) have shown that the late-maturing varieties can be grown only in low-lying areas where irrigation is available and that four distinct types are required to meet the requirements of the different areas of the Bajío and the Jalisco plateau, one taking 136–160 days to maturity, another 122–135, another 116–125 and a fourth being an early-maturing type resistant to drought. Hybrids fulfilling the last three of these requirements are now available and are described. Rocamex H-309 is a high-yielding hybrid maturing in 127–130 days, is free from lodging and can be sown at altitudes of up to 1900 m. with irrigation and up to 1600 m. without. It is a double cross from four inbred lines from the variety Celaya, (C90 x C243) x (C123 x M30-60), and resembles Celaya in type. It can be sown in all conditions where Celaya is grown and under irrigation has yielded over 30% more grain than Celaya; in 1952 a yield of 8.3 metric tons of grain of 15% humidity was reported.

Rocamex H-230 is a white semident hybrid maturing some eight days before H-309, which it excels also in drought resistance. It too is a double cross from four inbreds from Celaya, (C90 x Gto.20-247-2-2-4-5) x (C243-2-2 x Gto.29-29A-5-4). It has yielded 12% and more in excess of Celaya and under conditions of deficient humidity has even outyielded H-309. It stands well and is characterized by very good grain set.

Rocamex H-220 is a very early-maturing hybrid adapted to a wide range of conditions, including areas at altitudes up to 1900 m. It is produced by crossing C90 x Gto.20-247-2-2-4-5, both inbreds from Celaya, with a composite strain comprising five good lines from the variety Bolita, which is characterized by earliness and drought resistance. The hybrid matures in 104–110 days and under conditions of extreme drought in 1950 yielded some 50% more grain than Celaya, Pepitilla and other varieties; in 1951 and 1952, where Celaya yielded only 300 kg. of grain per ha. owing to early frosts, H-220 yielded 2.5 tons.

Second-generation seed of these hybrids also

gives higher yields than Celaya but the difference is only about half that obtained from the original hybrid and its use is not recommended.

2988 WELLHAUSEN, E. J., WORTMAN, S. & PETERNIANI, E.

**Comparison of original and third generation sibbed seed-stocks of  $S_1$  lines of corn.**

Agron. J. 1955 : 47 : 136–38.

In the maize breeding programme of the Rockefeller Foundation in Mexico,  $S_1$  lines have been used extensively for the production of commercial double and three-way crosses. Since this practice has been criticized on account of the problems arising from genetic variability of such lines, investigations have been carried out to compare the yield and other agronomic characteristics of 28  $S_1$  lines and their sib<sub>3</sub> counterparts when top-crossed with a common unrelated tester, to determine whether any changes in combining ability resulted from sibbing. A composite technique of sibbing was employed. In five of the lines combining ability for yield increased through sibbing. In four others combining ability decreased; this result may have been due to contamination or insufficient sample size in sibbing; in the remaining 19 lines no changes in combining ability were detected. No visible differences in agronomic characters other than yield were found between the  $S_1$  and sib<sub>3</sub> top crosses for a given line, even in cases where yield differences were considerable. A procedure for reducing the possibilities of contamination and unfavourable choice of plants in the propagation and use of  $S_1$  lines is outlined.

**Proceedings of Eighth Annual Hybrid Corn Industry-Research Conference held in Chicago, Illinois December 2 and 3, 1953 : Publ. No. 8 : Pp. 106.**

2989 Jones, D. F. *Progress report on male sterility.* (pp. 7–10).

Investigations on cytoplasmic male sterility at the Connecticut Agricultural Experiment Station are surveyed. Types S and T, found in Tepod maize and the white dent Mexican June respectively, have been transferred by back-crossing to inbreds with a wide range of maturity. The expression of pollen abortion due to S, T and other types of cytoplasmic male sterility varies according to the genotype. In most cases grain production in inbreds is not adversely affected by incorporation of S or T. In seed-production fields, sterile plants are

consistently more productive than normal ones, the difference being due to the injury from detasseling. The small amount of pollen produced by male-sterile parents is not effective in competition with normal pollen; many stocks are however now available which produce only 5% of the amount of pollen of normal stocks. Environmental conditions may influence pollen production by male-sterile inbreds or crosses, but the most widely used single crosses have proved to be satisfactorily stable not only in the USA but in other countries. Until more information on pollen-restoring genes has been gained, mixing of seed from male-sterile parents with seed from their fertile counterparts is advocated.

2990 *Brown, W. L. Sources of germ plasm for hybrid corn. (pp. 11-16).*

From a discussion of the significance of maize types and varieties of the US Corn Belt, Mexico and the West Indies as sources of germ plasm, it is concluded that in each of these areas the higher productivity has proved to be closely associated with diversity of ancestry. It is therefore suggested that as a long-term measure breeders should consider the possibility of breeding to obtain valuable gene combinations involving several diverse types.

2991 *Milner, R. T. Program on corn use. (pp. 20-30).*

In this discussion of recent developments in the utilization of maize in the USA and the research required for further advances, the role of the breeder is emphasized.

2992 *Rinke, E. H. Cold test germinations. (pp. 54-58).*

The techniques used at the Institute of Agriculture, Minnesota University, for making cold tests of germinating seed of maize are described. Inbreds have reacted differently in such tests. The behaviour of single crosses has shown that performance in cold tests is greatly influenced by the ♀ parent. In the case of the top cross and its  $S_1$ ,  $S_2$  and  $S_3$  progenies cited as an example of the effectiveness of selection for high germination percentage in cold tests, selection on an ear basis in the  $S_1$  would have eliminated a large number of undesirable genotypes.

2993 *Russell, J. S. The world's challenge to the hybrid corn industry. (pp. 96-103).*

The growing use of hybrid maize in Europe and other countries as the result of American co-operation is discussed with reference to its economic and political repercussions.

**Proceedings of Ninth Annual Hybrid Corn Industry-Research Conference held in Chicago, Illinois December 1 and 2, 1954 : Publ. No. 9 : Pp. 108.**

2994 *Tatum, L. A. Breeding for drought and heat tolerance. (pp. 22-28).*

The following are important criteria in selecting maize for resistance to soil and atmospheric drought: (1) high yield; (2) freedom from barrenness and weak shoots, together with the capacity to produce two ears per plant; (3) freedom from the type of firing which affects the lower leaves and then, under severe conditions, most of the plant; (4) freedom from top-firing; (5) early silking in relation to pollen shedding; and (6) long shedding period of the tassels. A combination of (5) and (6) would minimize any disturbance in the timing of tassel shedding and silking. Resistance to top-firing is recessive, a relatively small number of major genes being involved. A high degree of adaptation to droughty conditions may preclude adaptation to conditions favouring high production. The relations of the root system to drought resistance require much more investigation. In Kansas, the varieties Pride of Saline, Midland, Hays Golden and Crawford County Chief have been outstanding as sources of drought-resistant lines. The use of blends, multiple crosses and inherently variable hybrids might be used to extend the period of pollen shedding and in regions where strain x season and strain x locality interactions make choice of a hybrid difficult.

2995 *Ullstrup, A. J. Blight losses as related to degree of infection and resistance. (pp. 35-37).*

Data obtained in Indiana suggested that with very severe artificial epidemics, resistance of a double cross to northern corn leaf blight or southern corn leaf blight, as measured in terms of yield, was proportional to the number of resistant inbreds in the pedigree. With moderate epidemics, when the disease did not develop until late in the season, the degree of resistance of a hybrid was not necessarily related to its yield.

2996 *Sprague, G. F. Breeding for resistance to stalk rot. (pp. 38-43).*

Satisfactory techniques are available for evaluating reaction to stalk rot due to *Diplodia* and other pathogens. Different heterozygous stocks vary in the number of stalk-rot resistant lines which can be extracted from them, resistance being a quantitatively inherited character.



In general the rating for resistance to *Diplodia* stalk rot in artificial inoculation tests corresponds with that for resistance to stalk breakage.

2997 Dicke, F. F. *Breeding for resistance to European corn borer.* (pp. 44-53).

The biology of the first and second broods of corn borer is discussed in relation to the problem of resistance. Some of the important characters conferring resistance to first-brood infestation lose their effectiveness during second-brood attack. Breeding aims at resistance to the first brood and tolerance of the second. Methods of evaluating resistance and tolerance are outlined. Borer reaction probably depends upon multiple factors, as suggested by Patch *et al.* (cf. *PBA*, Vol. XIII, Abst. 172). Whereas selections resistant to first-brood larvae can be easily secured from most open-pollinated and synthetic varieties, the introduction of resistance into commercial susceptible inbreds is difficult since the degree of resistance retained is satisfactory only if two back crosses are made to the susceptible line. At the Iowa State College, the value of a procedure combining back-crossing and recurrent selection is being explored.

2998 Eckhardt, R. C. *Breeding for resistance to corn ear worm.* (pp. 54-60).

Breeding for resistance to damage of the ear by *Heliothis armigera* in Mississippi is surveyed. Single crosses provide the most critical data for evaluating inbreds for resistance. Highly resistant lines have been selected from open-pollinated varieties and double and single crosses. The degree of resistance in yellow inbreds has however been lower than that of white lines. The nature of resistance is analysed; the chief factors affecting resistance probably consist of inherent differences in the chemical composition of the silks, cob and kernel. Lines from the southern part of the USA offer the best sources of resistance to both earworm and northern leaf blight (*Helminthosporium turcicum*) in breeding in the Corn Belt.

2999 Haber, E. S. *Hybridization in related fields.* (pp. 80-84).

Comments are made on recent developments in the production of  $F_1$  hybrids of sweet corn, onion, tomato, water melon, petunia and tetraploid snapdragon in the USA.

3000 Rogers, J. S. *Breeding for pollen restorers.* (pp. 85-93).

A number of inbreds already in commercial use in the USA have been identified as satisfactory pollen restorers. Two hybrids, Texas 17W and Texas 32, produced by means of pollen-restoring inbreds, were released to seed growers in 1954.

Methods of transferring pollen-restoring genes to commercial inbreds are discussed, with particular reference to the system proposed by Eckhardt (cf. *PBA*, Vol. XXIV, Abst. 159). Pollen restoration has usually appeared to be a monogenically determined capacity. Several generations of back-crossing, followed by selfing, will be required for the production of stable restorer lines. Such lines, which have not yet been developed, will have to be tested under a wide range of environmental conditions to determine the effectiveness of the restorer gene. In Texas the open-pollinated variety Golden June has proved to be a particularly good source of pollen-restoring lines. It is suggested that the male-fertile plants occasionally occurring among male-sterile stocks as the result of mutation provide an additional means of securing restorer inbreds.

3001 HALTIWANGER, W. L., FRIANT, R. J. & BOLYARD, V. L.

**Results of hybrid corn yield trials in West Virginia for 1954.**

Curr. Rep. W. Va. agric. Exp. Sta. 1955 : No. 9 : Pp. 10.

The results of trials of maize hybrids at 28 centres are summarized in tables.

3002 **Best corn hybrids for North, Central and Southern Mississippi listed by station.**

Sth. Seedsman 1955 : 18 : No. 4 : p. 59.

Six maize hybrids are recommended by the Mississippi Agricultural Experiment Station for northern parts of the state, seven for the central region and three for the south. Three experimental hybrids, Miss.1125, 3208 and 1123, have shown promise in the 1954 tests.

3003 **Texas farmers to have two new corn hybrids for this year's planting.**

What's New Crops Soils 1955 : 7 : No. 4 : p. 24.

Texas 17W, a large-grained white hybrid, is 3 to 4 days later than Texas 11W. It is resistant to root lodging and stalk breaking. The yellow hybrid Texas 32 is similar in performance to Texas 26, 28 and 30, but has longer ears, smaller grain and usually only one ear per stalk. It is resistant to root lodging. Both hybrids were developed at the Texas Agricultural Experiment Station.

3004 **Seed of new corn hybrid Tennessee 29 available.**

Sth. Seedsman 1955 : 18 : No. 5 : p. 43.

Tennessee 29, a hybrid developed by the University of Tennessee Agricultural Experiment Station, is equal or slightly superior to Dixie 33

in yield, bears white kernels of good milling quality and has a vigorous root system and strong stalk.

- 3005 JUGENHEIMER, R. W.  
**Experimental corn hybrids: 1954 tests.**  
 Bull. Ill. agric. Exp. Sta. 1954 : No. 584 : Pp. 32.

The results of trials of experimental hybrids of maize conducted in various parts of Illinois during 1954 are reported. The entries included a number of blight-resistant three-way crosses.

- 3006 **1954 Illinois corn tests.**  
 Bull. Ill. agric. Exp. Sta. 1955 : No. 585 : Pp. 31.

The results of tests carried out on commercial hybrids of maize at several centres in Illinois during 1954 are summarized.

- 3007 **Three new corn hybrids perform well in tests; released in Minnesota.**  
 What's New Crops Soils 1955 : 7 : No. 7 : p. 25.

Developed at the University of Minnesota, Minhybrid 509 and 511 are adapted to south-central Minnesota, have a maturity period of 107 to 111 days, give higher yields than other hybrids of similar maturity and are more resistant to stalk breaking. Minhybrid 414 has a maturity period of 110 to 114 days and shows similar advantages over older hybrids.

- 3008 HUTCHCROFT, C. D. & ROBINSON, J. L.  
**The 1954 Iowa corn yield test.**  
 Bull. Ia. agric. Exp. Sta. 1955 : No. P118 : Pp. 34.

Tabulated data on the yield, stand, moisture content at harvest, root and stem lodging and shedding of ears of numerous hybrids tested at 11 localities in Iowa are presented and briefly discussed.

- 3009 CLAPP, A. L., TATUM, L. A. & BURKHARDT, C. C.  
**Kansas corn tests, 1954, with supplement on corn insects.**  
 Bull. Kans. agric. Exp. Sta. 1953 : No. 373 : Pp. 46.

A report is given of results obtained from tests of 120 maize hybrids and the open-pollinated variety Pride of Saline.

- 3010 MCAFEE, T. E., ROGERS, J. S., BATES, R. P. & BOCKHALT, A. J.  
**Hybrid corn in Texas.**  
 Sth. Seedsman 1955 : 18 : No. 2 : 71-72, 74.

Information is given on the performance of

hybrids tested at 19 localities in Texas in 1954. The yellow hybrids Texas 26 and 28 gave consistently high yields and were the most widely adapted. The white hybrid Texas 17W, which is three days earlier than the yellow hybrids, was one of the highest yielders under conditions of drought.

- 3011 BRIEGER, F. G.  
 Considerações sobre o emprego de variedades sintéticas no melhoramento do milho—I—Sintéticos simples. (**Considerations on the use of synthetic varieties in breeding maize. I. Simple synthetics**).  
 An. Esc. Agric. Queiroz 1951 : 8 : 769-800.

Various arguments for and against the use of hybrid corn are examined. Among the latter is the danger of losing valuable germplasm carried by local varieties, of which there is such an abundance in South America, and the literature dealing with synthetic hybrids is reviewed. The author's experience in Brazil has shown that in making synthetics it is important to use only inbred lines of good combining ability; when a good variety that has already been subjected to a certain amount of selection is used as one of the parents one generation of inbreeding should suffice. Multiple crosses are made for a number of years and selection is exercised for type and vigour and for relative freedom from segregation. The multiple hybrids with the best behaviour are then planted together in mixed sowings. In this way good synthetic hybrids have been produced, P-139 and P-140 from local Catêto varieties and P-138 from material from Rio Grande do Sul. Certain defects are demonstrated in the formulae of Sewall Wright and of Mangelsdorf and calculations are presented which show that by starting with a fair number of inbreds, say 10, and carrying out selection for the most vigorous plants in each generation, the amount of consanguinity is negligible; this has been supported by the behaviour of the synthetics in later generations, which have shown very little reduction in yield.

- 3012 YEPES Y., E. A.  
 Los primeros trabajos de mejoramiento de maíz en Colombia. (**The first work on maize improvement in Colombia**).  
 Agricultura trop. 1955 : 11 : 301-03.

Reference is made to the work of E. Chavarriaga Misas, who began selecting selfed lines from local varieties of maize in Colombia in 1944. By 1950 he and his collaborators had produced Colombia-1 and Colombia-2, yellow and white



varieties respectively, for temperate climates, Colombia-4 and Antioquia, yellow and white varieties respectively, for hot climates, a commercial hybrid Heto (Colombia-1 x line 21) and two varieties of sweet corn, for temperate and hot climates respectively. Colombia-1 and 2 were produced by selection from complex crosses of Venezuela-1, Cuba blanco [White Cuba] and Urrao blanco [White Urrao]. A synthetic variety Eto was also produced by complex crossing between Venezuela-1 and Colombia-1 and a number of promising varieties introduced from the USA, Mexico, Venezuela, Brazil and elsewhere. Tables of grain yield for 1949 show the average of Colombia-1, Colombia-2 and Eto to have been 101, 152 and 147% above that of the common local maize Amagaceño. A hybrid of Line 1 x Line 21 yielded 4600 kg. of grain per ha. in 1950 as compared with 2884 kg. from Eto and 4391 kg. from the hybrid Rocol H201 [Eto x (Line 1 x Line 21)].

### 3013 Hybrid maize.

Trends, Sydney 1955 : 3 : No. 3 : 9-12, 16.  
A short account of hybrid maize is given, chiefly with reference to its potential value for Australia and to recent progress achieved in the use of hybrid seed in New South Wales.

### 3014 RYAN, F. E.

#### Maize grain trial.

J. Agric. W. Aust. 1955 : 4 : 71-74.

In a trial conducted at Denmark Research Station, Western Australia, during 1953-4, the six hybrids tested generally outyielded the open-pollinated standard variety, Emblem (NEH 7) giving the highest yield.

### 3015 MANGELSDORF, P. C.

#### George Harrison Shull.

Genetics 1955 : 40 : 1-4.

This obituary account includes a description of Shull's genetical researches, of which the most widely recognized is his pioneer work on hybrid vigour in maize.

### 3016 ARRUDA, H. V. DE.

Diferença entre as variâncias do erro experimental para híbridos e variedades de milho. (Difference in the variance of the experimental error for hybrids and varieties of maize).

Rev. Agric., Piracicaba 1955 : 30 : 61-64.

The variance was not significantly different for two groups comprising hybrids and open-pollinated varieties respectively, tested in different places and years.

### 3017 JOSEPHSON, L. M., STEAD, B. & VILJOEN, P.

#### Results maize variety trials. Highveld Region 1953-54.

Fmg. in S. Afr. 1955 : 30 : No. 346 : 27-31.

Of 39 hybrids and varieties tested in eight district trials in the highveld region, the white dent hybrid P3158 and the yellow dent hybrid P4037 gave the highest average yields. Hybrids outyielded varieties by an average of 24.2%. The flint hybrids were earlier than the dent, had lower moisture content and showed more erect plants and fewer ears damaged by caterpillars. Information is given on the agronomic characters of two double hybrids and three top crosses which showed promise in further trials.

### 3018 ZSCHEISCHLER, J.

Welche Maissorten sollen importiert werden? (Which maize varieties should be imported?)

Saatgutwirtschaft 1955 : 7 : 171-74.

In view of the considerable quantities of hybrid seed, mainly from the USA, that have to be imported to supplement Western German production, the Bavarian State Seed Institute, Weihenstephan, has in recent years conducted trials to determine which hybrids are best adapted to different areas of south-western Germany. Some of the results of these trials are presented; in general it is concluded that hybrids belonging to the 85-90 day maturity group in the USA offer the best possibilities for cultivation under West German conditions.

### 3019 SCHOBER, K.

Hybridmais sichert hohe Erträge. (Hybrid maize guarantees high yields).

Landwirtschaft 1955 : No. 8 : 3-4.

The Austrian Ministry of Agriculture recommends the Hungarian hybrid Mv5 and the American hybrids U32 and Wisconsin 355 for cultivation for grain in Austria and Iowa 4316, U32 and Wisconsin 355 and 416 for silage and green fodder.

### 3020 ROBINSON, H. F., COMSTOCK, R. E. & HARVEY, P. H.

#### Heterosis in crosses between open-pollinated varieties of corn.

Genetics 1954 : 39 : p. 990. (Abst.).

The validity of some of Crow's assumptions concerning the role of overdominance in heterosis in maize is questioned (cf. *PBA*, Vol. XIX, Abst. 714); it is suggested that the overdominance hypothesis is not compatible with large amounts of heterosis in intervarietal crosses if the genes in the parent populations are at an

equilibrium between mutations and selections. The average yield of the intervarietal crosses studied exceeded the mean yield of parent varieties in two years at three centres by approximately 20%. The use of reciprocal recurrent selection, with two open-pollinated varieties as foundation material, is proposed as a breeding procedure for improving both the yielding ability and other characters of an intervarietal cross.

3021 PAP, E.

A heterózisos kukoricánemesítés módszerei. (**Methods of improving corn by heterosis**).

Növénytermelés 1952 : 1 : 85-92.

Yield trials in Hungary during 1951 showed the superiority of intervarietal hybrids over varieties and the even greater superiority of hybrids between Hungarian inbred lines. Especially satisfactory results were obtained from the mid-late Hybrid 1 and the mid-early Hybrid 5, both produced from Martonvásár lines. The value of inbred lines is being tested by three-way crosses with single-cross testers.

3022 SCHULER, J. F.

**Natural mutations in inbred lines of maize and their heterotic effect. I. Comparison of parent, mutant and their  $F_1$  hybrid in a highly inbred background.**

Genetics 1954 : 39 : 908-22.

Dominance and overdominance are commonly postulated as explanations of heterosis; superiority of the heterozygous genotype over both homozygous classes with respect to a single locus in a homozygous background would provide evidence of one type of overdominance. Tests were carried out to compare (1) the genotypes  $AA$ ,  $Aa$  and  $aa$  for 12 recessive mutations which had arisen spontaneously in lines inbred for a long period, and (2) the original homozygous recessive stocks and the homozygous recessives recovered by selfing or back-crossing plants heterozygous for the mutations to the recessive stocks. It was however possible to analyse the data from test (2) only in the case of three mutants, viz. narrow leaf, green stripe and dwarf SW1. According to the results obtained from test (1), the 12 mutants could be classified into three groups: (a) mutants in which the heterozygous genotype was distinctly superior in all or most of the attributes studied, (b) those displaying no heterotic effect and (c) those showing intermediate or erratic differences between heterozygotes and homozygotes. The mutants green stripe and dwarf SW1 belonged

to group (a). In test (2), highly significant  $F$  values were obtained for the variance ratios of the relevant discriminant functions, indicating that the two categories of plants homozygous for each of the three recessive mutations differed with respect to loci other than the single locus for the given mutation; it is therefore not possible to interpret the results in test (1) on the green stripe and dwarf SW1 mutants as indicating heterosis due to a single locus.

3023 MAZOTI, L. B.

Caracteres citoplasmáticos heredables derivados del híbrido de "*Euchlaena*" por "*Zea*." (**Heritable cytoplasmic characters derived from the hybrid of *Euchlaena* with *Zea***).

Rev. Invest. agric. B. Aires 1954 : 8 : 175-83.

This is the full account of the work referred to in Abst. 1033.

3024 MAZOTI, L. B.

Variación citoplasmática heredable y su reversión por acción de genes simples en maíz. (**Heritable cytoplasmic variation and its reversion by the action of simple genes in maize**).

Rev. Invest. agric. B. Aires 1954 : 8 : 185-86.

This work has already been referred to in Abst. 1034.

3025 MAZOTI, L. B., ROSSI, J. C. & SOSA, H. A.

Estudios sobre el origen natural de variaciones heredables en maíz. (**Studies on the natural origin of heritable variations in maize**).

Rev. Invest. agric. B. Aires 1954 : 8 : 161-74.

The  $F_2$  and later generations of an inbred maize line from Santa Fe in Argentina contained frequent mutations of a group of three characters, white endosperm, albino seedling and viviparous embryo, all closely linked together ( $y w vp$ ) and to the gene  $bm_1$  in chromosome 5. Other characters which appeared suddenly in the same line were intense yellow endosperm, tassel seed and atrophied ear. In the seventh selfed generation some plants were obtained in which  $w$  had reverted to  $W$ , producing green seedlings with white endosperm and viviparous embryo. No similar variations were detected in sister lines of the variant stock or in its parental lines, which when crossed with standard normal stocks gave normal progeny, apart from occasional viviparous and tassel-seed mutants not allelomorphic with those of the mutating stock. The sudden mutability and subsequent



stability of this line cannot be satisfactorily accounted for and are ascribed to some transitory factor for instability.

Another line that appeared among the selfed progeny of the Cornell testers displayed multiple mutation of characters involving anther colour, pollen fertility and aleurone colour, which appeared in sectors of the inflorescences only, and plant anthocyanin, cob colour, variegation and tassel seed, all of which gave regular Mendelian inheritance. The tendency for multiple mutation was transmitted to many plants of the progeny when this line was crossed with normals. Cytological examination of the aberrant line showed the nucleolus to be very pale after staining and the nuclear membrane to be frequently lacking at meiosis.

In certain inbred lines from local Argentine flint varieties further mutants of the *vp w y* type, allelomorphous with that previously described, were found in conjunction with chromosome aberrations and the mutation *bm*<sub>1</sub>. It is pointed out that the introduction into a population of cultivated maize of an unstable line such as the ones described may lead to widespread and unpredictable variation; some of the mutations, it is further indicated, may be of an advantageous nature.

3026 NUFFER, M. G.

**Dosage effect of multiple *Dt* loci on mutation of *a* in the maize endosperm.**

Science 1955 : 121 : 399-400.

The mutability of certain *a* alleles at a locus on chromosome 3 is affected by the gene *Dt* (*Dt*<sub>1</sub>) on chromosome 9 (cf. *PBA*, Vol. VIII, Abst. 1553); mutation from *a* to *A* is recognizable, in the presence of the appropriate complementary genes, by the production of purple (*Aa*) sectors in the plant tissue and by small red or purple dots (*Aaa*) on the colourless (*aaa*) aleurone. Two further *Dt* genes, *Dt*<sub>2</sub> and *Dt*<sub>3</sub>, have been discovered in a Brazilian variety and in Peruvian maize, respectively. The gene *Dt*<sub>2</sub> is located on the long arm of chromosome 6 and is linked with *Y* for yellow endosperm with a recombination value of 26%; *Dt*<sub>3</sub> is situated on the long arm of 7. The genes *Dt*<sub>1</sub>, *Dt*<sub>2</sub> and *Dt*<sub>3</sub> all cause *a* or *a*<sup>m</sup> to mutate at comparable frequencies and when the dosage of each *Dt* gene is increased from one to three in the endosperm an exponential increase in reversion is obtained. The three *Dt* genes have similar dosage relationships but at present data for the addition of different doses of *Dt*<sub>1</sub> and *Dt*<sub>2</sub> only are available. The frequency of seed dotting

increased with increasing *Dt* dosage up to six doses, although the type of curve obtained could not be ascertained. The dots at all dosages possessed the same size, shape and colour intensity.

3027 SINGLETON, W. R. & CASPAR, A. L.

**Effect of time of gamma radiation on microspore mutation rate in maize.**

Genetics 1954 : 39 : p. 993. (Abst.).

Most of the mutations induced as the result of  $\gamma$  irradiation (1300 r.) were produced at an entirely different time from maximum chromosomal damage as measured by pollen injury. Meiosis was the most sensitive period for pollen injury, at least 95% of the grains being damaged. The same amount of radiation administered 3 or more days later resulted in approximately 10% injured grains. The time of greatest sensitivity for the production of mutations occurred, however, 10 days after meiosis, the rate of mutation for endosperm characters exceeding 3% per gene. The average seed set was extremely low in the case of irradiation during meiosis; with later treatments it rose rapidly to a maximum of 200 seeds per ear, dropped to about 100 seeds per ear just before the period of maximum production of mutations and then rose to 250 per ear during this period. The frequency of mutation dropped sharply for irradiations during the last 2 days before pollen shedding.

3028 PHINNEY, B. O. & KAY, R. E.

**Interaction of environment and genotype in the expression of a virescent gene, pale-yellow-1, of maize.**

Hilgardia 1954 : 23 : 185-96.

The seedling character pale-yellow-1 depends upon a single gene mutation which was induced by atom-bomb irradiation. The seedlings are initially a uniform pale yellow when grown in either light or dark. Exposed to light, they eventually turn green; when kept in the dark they become bright yellow. The dark-grown mutants become yellower in colour at the same age as the light-grown mutants turn green; the mutation therefore appears to control accumulation of both chlorophylls and carotenoids. The length of time the mutants remained entirely pale yellow was not influenced by plastid size and number, type of culture medium, previous exposure to light or removal of the endosperm. The time required for the mutants to show initial greening was however strongly dependent upon the

temperature; as the temperature approached 35° C., the time required for greening converged with that of normal individuals. For nine-day-old seedlings, the rate of greening was the same for mutant and normal forms at 25° C. and above; at 16.5–25° C. the mutant seedlings turned green at a slower rate than normal individuals. The minimum temperature for greening was 16.5° C. for the mutants and 12.0° C. or lower for normal seedlings.

3029 KOZUBENKO, V.

**(Sowing the best varieties—an important method of improving maize yields).**

Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955 : No. 3 : p. 20. [Russian].

Material referred to in this article has been previously described in Abst. 1005.

3030 LIN, M.

**Chromosomal control of nucleolar composition in maize.**

Diss. Abstr. 1955 : 15 : Publ. No. 10,507 : 18–19.

Examination of pollen mother cells by means of an ultraviolet microspectrophotometer indicated the presence of ribonucleic acid (RNA) and protein in the nucleolus. During meiosis I the size of the nucleolus and its RNA content increased until mid-pachytene and then decreased, the nucleolus finally disappearing at late diakinesis. Evidence was obtained that during nucleolar growth the RNA content increases faster than the protein content and that the synthesis of or incorporation of proteins in the nucleolus is dependent upon RNA. The RNA content became doubled at some time between mid-leptotene and zygotene, possibly as the result of reduplication of the nucleolar organizer during leptotene. A linear relationship was established between the RNA content of the nucleolus and number of extra nucleolar organizers present on supernumerary B<sup>6</sup> chromosomes. Extra organizers did not cause changes in the RNA/protein ratio. Extra heterochromatin or euchromatin did not appear to have any appreciable effect upon the DNA content of the nucleolus. It is concluded that the nucleolar organizer is involved in the actual synthesis of nucleolar material, the entire chromosome probably being involved in the formation of the nucleolus, since changes in DNA content, although not in the DNA/protein ratio, were found in plants with a translocation involving the nucleolar chromosome.

3031 FABERGÉ, A. C.

**The analysis of chromosome breaks by endosperm phenotype in maize.**

Genetics 1954 : 39 : p. 966. (Abst.).

Investigations have been carried out on chromosome breaks by means of the procedure of irradiating pollen carrying the dominant endosperm markers *I*, *Sh*, *Bz* and *Wx* in the short arm of chromosome 9, and using the corresponding recessive as the female parent. Data obtained by this method have indicated that a broken end may (1) restitute, (2) rejoin with another free end or (3) remain free and give a chromatid breakage-fusion-bridge cycle. An estimate of the minimum proportion of breaks undergoing restitution is approximately nine-tenths of the total number of breaks. Since the point of origin of a breakage-fusion-cycle is a single break, a map may be constructed from the frequency of such breaks arising in marked chromosome segments. The map so obtained was fairly similar to the standard linkage map, but the region distal to *I* and that between *Wx* and the centromere had an excess of breaks relative to their genetic lengths.

3032 EMMERLING, M. H.

**An analysis of ultraviolet and X-ray radiation on chromosomes of *Zea mays*.**

Diss. Abstr. 1955 : 15 : Publ. No. 10,106 : p. 12.

Deficiency aberrations induced in chromosome 9 and 10 by ultraviolet and X radiation were investigated, homozygous recessive stocks being fertilized by treated pollen from homozygous dominant stocks. In the chromosome-9 series, various terminal knobs on the short arm of this chromosome and the gene *Bz* were used as markers. In the chromosome-10 series, R<sup>r</sup> and knob 10 constituted the markers. Aberrations were induced with a higher frequency in the X-ray than in the ultraviolet series, although probably terminal deficiencies occurred with a lower frequency in chromosome 9 after X irradiation than after ultraviolet treatment. Among the 19 deficiency-translocations in the X-ray series, all were of the 3-chromosome type; in the ultraviolet series one 3-chromatid and two 3-chromosome types were obtained. Knob 10 had no influence upon the production of spontaneous aberrations.

3033 BARCLAY, P. C. & BRINK, R. A.

**The relation between modulator and activator in maize.**

Proc. nat. Acad. Sci. Wash. 1954 : 40 : 1118–26.

It is shown that modulator (*Mp*) postulated as



a component of the allele  $P^{vv}$  for variegated pericarp (cf. *PBA*, Vol. XXIII, Abst. 1171) is similar to, if not identical with activator ( $A_c$ ), a unit identified by McClintock as being in control of instability and chromosome breakage at  $D_s$  (cf. *PBA*, Vol. XXIII, Abst. 5). Like  $A_c$ ,  $Mp$  promoted breakage at  $D_s$  when the last-named locus was at the standard position in the short arm of chromosome 9.

3034 EL-GHAWAS, M. I.

**A cytogenetic study of segregation in autotetraploid maize involving genes at different distances from the centromere.**

Diss. Abstr. 1955 : 15 : Publ. No. 10,742 : 192-93. (Abst.).

Segregation with respect to the following loci was investigated in autotetraploid stocks:  $bm_2$ , chromosome I;  $B$  and  $lg_1$  II;  $cr_1$  and  $a_1$ , III;  $su_1$ , IV;  $C$ ,  $wx$  and  $I$ , IX; and  $g_1$ , X. The values of  $\alpha$  were calculated for each locus and proved to be in general agreement with the supposed position of the loci relative to the centromeres. The ratios of segregation for the different loci were also tested for their goodness of fit to Muller's and Haldane's ratios. Chromosome segregation ratios were approached in the case of  $su_1$  and  $wx$ , and chromatid segregation ratios in the case of the remaining six loci. The chromosome number ranged from  $2n = 36$  to 47. At diakinesis, the 40-chromosome plants showed varying numbers of quadrivalents and bivalents, with occasional trivalents and univalents. Among the aneuploids, disomic, trisomic, pentasomic and hexasomic individuals were recognized. The  $\alpha$  values could not be used in calculating accurately the distances between the loci and corresponding centromeres since the  $\alpha$  value appeared to be affected by unmeasurable variables.

3035 SEANEY, R. R.

**Studies on monploidy in maize.**

Diss. Abstr. 1955 : 15 : Publ. No. 10,753 : 187-88. (Abst.).

In investigations at Cornell University, the identification of monploids was facilitated by means of Randolph's marker stock  $a_1 B Pl C R Pr lg$ ; in hybrid progeny from crosses involving this brown liguleless inbred line the occasional maternal and paternal monploids could be identified by their lack of purple plant colour ( $A_1$ ). Maternal monploids were obtained with a frequency of 0.73 per 1000 seeds, paternal monploids with a frequency of 1 per 187,500 seeds. The frequencies of monploids obtained from single crosses were not invariably inter-

mediate between those recorded for the parent lines. No significant reciprocal differences between single crosses were detected with respect to frequencies of monploids. With inbred B8 as pollen parent significantly higher frequencies of monploids were obtained than with inbred Oh51A. Significantly greater frequencies of such plants were found in successive self-pollinated generations of the commercial hybrid Funk G-6. No increase in frequencies was secured by using pollen stored for 24 hours or pollen from tetraploids of the marker. Higher frequencies were however obtained by delayed pollination, significantly more monploids being found in seeds from the base of the ears than from its apex. When pollination of Cornell M-1 was delayed 14-15 days, the larger seeds included a higher number of monploids than the smaller seeds. It is stated that by treating monploids with 0.5% colchicine solution an increase of 32-49% in the number of self-fertile monploids was obtained.

3036 GAUSMAN, H. W. & DUNGAN, G. H.

**Some effects of certain plant growth substances on maize.**

Bot. Gaz. 1954 : 116 : 29-40.

Of the growth substances used in experiments at the Illinois Agricultural Experiment Station, naphthaleneacetic acid delayed anthesis and silking to an extent suggesting that it may be applied to promote synchronized flowering of inbreds and single crosses in hybrid seed production. The two single crosses tested,  $WF_9 \times 38-11$  and  $WF_9 \times Hg_2$ , displayed marked differences in their responses to growth substances, as indicated by their behaviour with respect to amount of tillering, time of anthesis and silking, formation of adventitious roots and wind damage resulting from brittleness.

3037 BALJURA, V. I.

**(The cultivation of maize in the Nonchernozem Belt).**

Agrobiologija (Agrobiology) 1955 : No. 2 : 17-32. [Russian].

Breeding methods used at Nemčinovka include the raising of plants from seed with the endosperms removed and selecting early-maturing forms that germinate at a temperature of 7-8° C. Work on the improvement of Nemčinovka (Belaja Angliiskaja [White English]  $\times$  Minnesota 13 Extra) and Moskovskaja Rannjaja [Moscow Early] (Belaja Angliiskaja  $\times$  Gruševskaja) continued. The former produces large amounts of green matter and a high percentage of kernels that reach waxy ripeness before the frosts set in.

The latter variety outyields Pervenec [First-born] without being appreciably later in maturing than this Siberian strain. It has a habit suitable for combine harvesting.

3038 LENG, E. R. & BAUMAN, L. F.

**Expression of the "Kys" type of male sterility in strains of corn with normal cytoplasm.**

Agron. J. 1955 : 47 : 189-91.

According to Schwartz (cf. *PBA*, Vol. XXII, Abst. 1878), the Kys type of male sterility in maize is expressed only in plants which possess the appropriate cytoplasm and are heterozygous or homozygous for the dominant gene  $Ms_{21}$  for male sterility and homozygous for the recessive suppressor  $s^{ga}$ . This type of sterility appeared to offer considerable advantage as a source of male sterility in hybrid breeding to eliminate the need for detasseling. The feasibility of exploiting the Kys type of sterility depended upon the recovery of cytoplasmically fertile but genotypically sterile ( $Ms_{21}Ms_{21}s^{ga}s^{ga}$ ) inbred lines which would be phenotypically male fertile. Such lines could be used as pollen parents in crosses with male-fertile lines of the constitution cytoplasmically male sterile,  $ms_{21}ms_{21}s^{ga}s^{ga}$ , to give fully male sterile single crosses for use as females in double crossing with normal single hybrids carrying the genes  $Ms_{21}Ms_{21}S^{ga}S^{ga}$  and fertile cytoplasm. The results of an attempt at the Illinois Agricultural Experiment Station to produce such lines have, however, suggested that no special condition of the cytoplasm is essential for the expression of the Kys type of sterility. It is therefore recommended that use of this source of sterility in breeding should be discontinued.

3039 BRIEGER, F. G.

**The structure of the maize inflorescence.**

An. Esc. Agric. Queiroz Anex. VIII : Bol. 10 : 1952 : 1-46.

A comparative morphological description of the inflorescence in *Zea*, *Tripsacum* and *Euchlaena* is given. The inflorescence in all these genera is regarded as of the standard grass type though complicated by increase in row number and loss of the basic  $\frac{1}{2}$  phyllotaxis, increase in the number of side branches, increase in the number of spikelets and florets, lateral dislocation of primordia, and irregular elongation of the internodes. A general discussion of cob structure is also presented.

The value of inflorescence characters for the classification of maize varieties is considered

but it is concluded that no single character can be used as a basis for discrimination.

3040 PELTON, J. S.

**Expression of the gene  $d_1$  in the scutellum of maize.**

Butler Univ. bot. Stud. 1954 : 11 : 192-99.

In a study of the effects produced on scutellum and kernel size by the recessive gene  $d_1$ , which governs the expression of dwarfness in the adult plant, it was found that the size of the scutellum of the dwarf seeds was significantly smaller than that of normal seeds in only one of four inbred lines segregating for this factor. In no case was there a significant difference in kernel size between doubly recessive and normal seeds.

3041 LINDEMANN, E.

**Die Eignung deutscher Maissorten für die Stärkegewinnung. (The suitability of German maize varieties for the production of starch).**

Züchter 1955 : 25 : 129-32.

In laboratory tests at the Federal Research Station for Processing Cereals, Detmold, the German varieties Pfarrkirchner Körnermais [Pfarrkirchen Grain Maize] and Gelber badischer Landmais [Yellow Baden Land maize] proved as suitable for the commercial extraction of starch as the seven principal foreign varieties normally imported for this purpose.

3042 EL-KHISHEN [AL KHISHIN], A. A.

**Comparative yield tests with hybrid corn double crosses introduced from U.S.A.**

Alexandria J. agric. Res. 1953 : 1 : 29-36.

Of a large number of American double-cross hybrids tested in three localities in Egypt during the period 1947-9, none was significantly higher in yield than the locally adapted open-pollinated variety American Early. Late hybrids did better than early or medium hybrids.

3043 KOZYRJ, A. T.

**(Spacing of maize plants).**

Zemledelie (Agriculture) 1955 : No. 4 : 43-45. [Russian].

Data on the beneficial effect of wide spacing upon yield in the hybrids Uspeh [Success] and VIR42 [Plant Industry 42] in the Dnepropetrovsk province are presented. Of the two hybrids, VIR42 showed the better response.

3044 ROBINSON, H. F., COMSTOCK, R. E. & HARVEY, P. H.

**Genetic variances in open pollinated varieties of corn.**

Genetics 1955 : 40 : 43-60.

Estimates of the additive and dominance



variances for various quantitative characters were made from an analysis of the progenies obtained by biparental crosses within the open-pollinated varieties Jarvis, Weekley and Indian Chief. For all characters, the dominance variance was less than the additive variance; considerable additive variance in grain yield appeared to exist.

Possible ways of reconciling the considerable degree of additive genetic variance for yield with the ineffectiveness of intravarietal selection are discussed.

- 3045 OLJŠANSKIĬ, M. A.  
(**The Nonchernozem Zone should become a big producer of maize**).  
Agrobiologija (Agrobiology) 1955 : No. 2 : 12-16. [Russian].

New silage varieties bred in the Moscow province and distinguished by earliness are referred to briefly. They develop ears that reach a near-ripe state 7-10 days before the frosts set in and produce mature seed in the field nursery.

- 3046 DROZDOV, N. A.  
(**The development of maize cultivation towards the north**).  
Priroda (Nature), Leningrad 1955 : No. 4 : 72-77. [Russian].

Brief descriptions of some varieties suitable for ensilage and adapted to cultivation in northern Russia are given. They include tall midseason types such as Partizanka [Partisan] from Sterling x Harjkovskaja Belaja Zubovidnaja [Harjkov White Dent] and the early, short, vigorously tillering flint strains Leningradka and Čišminskaja 1. The two last-mentioned varieties have growth periods of 90-120 days and yield 300 c. green matter per ha. Leningradka was obtained by open pollination involving some early Siberian forms and Čišminskaja 1 selected from Irbitskaja, a variety grown in the Sverdlovsk province.

- 3047 HOOKER, A. L.  
(**Corn diseases in Iowa nurseries in 1953 and 1954**).  
Plant Dis. Repr. 1955 : 39 : 381-83. (Mimeographed).

An account is given of the use of a plot in which simultaneous evaluations of maize selections for resistance to *Helminthosporium turcicum* and several other diseases and also to corn borer may be accomplished. A low-lying area was chosen and additional humidity was provided by means of a portable mist-producing machine. Field and greenhouse tests for reaction to

*Puccinia sorghi* suggested that two types of resistance to this pathogen occur, viz. protoplasmic resistance expressed at all stages, and mature-plant resistance.

- 3048 OZERNYĬ, M. & MEKŠIN, D.  
(**For 150 centners maize grain from each hectare**).  
Kolhoz. Proizvod. (Collect. Fm. Prod.) 1955 : No. 5 : 16-17. [Russian].

Partizanka [Partisan], from Sterling x Minnesota 23, which has outyielded the parents by a good margin in the Dnepropetrovsk province, has now been crossed with the hybrid Dnepropetrovsk 5 by which it is hoped its yield and drought resistance will be further improved.

## BARLEY

- 3049 AUFHAMMER, G. & FISCHBECK, G.  
Ergebnisse mehrjähriger Sortendüngungsversuche zu Sommergerste. (**The results of several years' variety and fertilizer trials with spring barley**).  
Z. Acker-u. PflBau. 1955 : 99 : 151-82.

In these trials, which were conducted under the aegis of the Institute of Crop Plants, Weißenstephan, Bavaria, during the period 1950-52, different levels of nitrogen and potassium phosphate were used to determine varietal differences in reaction to fertilizer and consequent tendency to lodging. In all cases, yields were increased by the application of fertilizers but varieties possessing a high degree of resistance to lodging, such as Strengs Franken III [Streng's Franconia III], Donaria and Astra, benefited most. It is suggested that future breeding programmes aim at producing varieties with short, thick, nonbrittle stems able to take full advantage of high levels of artificial fertilizer.

Soil and climatic conditions exercised a considerable influence on total yields of grain and straw and were the deciding factor in determining the order of productivity in which the varieties were placed, this order fluctuating considerably from year to year. For example, Hadostrong and Do M 172 were the most productive varieties in the excessively dry season of 1950 but in 1951 and 1952 they were heavily outyielded by varieties such as Astra and Isaria Nova. On the whole, the grain yields of Isaria Nova, Astra and Do M 172 were not increased by high levels of fertilizer to the same extent as those of many other varieties but their yield of straw was considerably improved.

3050 TOHTUEV, A. V.

**(Natural hybridization between barleys under Siberian conditions).**

Agrobiologija (Agrobiology) 1955 : No. 1 : 108-11. [Russian].

A small percentage of plants in a field of Omsk 10664 (var. *pallidum*) were hybrids between this multirowed variety and the two-rowed barley Vitjazj [Knight] (var. *nutans*). The offspring of these plants gave the following segregates in respect of ear characters: (1) 262 plants of *nutans* type, (2) 387 of *pallidum* type, (3) 458 intermediate two-rowed forms and (4) 178 intermediate multirowed forms. The plants resembling Omsk 10664 or Vitjazj were constant in the succeeding generations, but the intermediate forms have continued to segregate.

3051 KAMM, A.

**The discovery of wild six-rowed barley and wild *Hordeum intermedium* in Israel.**

Kungl. LantbrHögskolans Ann. 1954 : 21 : 287-320.

Highly variable populations of wild barleys, 23 specimens of which are described in detail, were found in three localities and included the following species and forms: at least two varieties of a six-rowed barley with a brittle rachis; a stable form of *H. intermedium* with a brittle rachis; *H. irregulare*; several varieties of two-rowed barley, other than *H. spontaneum*, also with a brittle rachis; and a large number of hybrids segregating for brittleness and apparently resulting from spontaneous crossing between six-rowed and two-rowed barleys. Evidence is presented suggesting that varieties such as the above-mentioned forms of *H. intermedium*, *H. irregulare* and some two-rowed varieties may be the result of the wide-scale hybridization occurring among wild six-rowed brittle barleys, *H. spontaneum*, *H. vulgare* and *H. distichum*. The evolution of cultivated barleys is discussed with particular reference to the development of species and varieties by hybridization.

3052 WIKLUND, K.

**The breeding of early two-rowed barley from crosses between two-rowed and six-rowed varieties.**

Kungl. LantbrHögskolans Ann. 1954 : 21 : 457-85.

At the Västernorrland branch of the Swedish Seed Association, two-rowed barley was found to need a higher temperature in July than six-rowed, but the two forms were otherwise similar in their climatic requirements. In an

attempt to combine the earliness of six-rowed with the general characteristics of two-rowed barley, some hybrids were obtained which were satisfactory in respect of earliness and grain size but poor in tillering and grain yield, the two last-mentioned characters being strongly and positively correlated in two-rowed barley. A strong negative correlation between tillering and earliness appeared to be due in part to genetical linkage and was broken in a strain from the cross Opal x Vega. The two-rowed hybrids often had much longer straw and fewer and larger grains per ear than their two-rowed parents.

3053 SAWICKI, J.

**Ciekawa forma jęczmienia uprawnego *Hordeum sativum* Jess. (An interesting form of cultivated barley, *H. sativum* Jess.).**

Acta Soc. Bot. Polon. 1953 : 22 : 605-15.

During studies of local grain varieties in the Carpathians and Carpathian Lowlands, a single specimen of a new form of barley of the species *H. sativum* Jess. was found by the author near the village of Kluszkowce. The surrounding barley in the field consisted mainly of var. *nutans* with some var. *erectum*, spring wheat and oats being also present sporadically. When the ears of all the other barley plants had attained full ripeness, the ear of this specimen was still green, the glumes and awns remaining green for another 3 to 4 days after the rest of the plants had lost their green colour, thus prolonging assimilation and the storage of carbohydrates. The plant had no tillers.

In this new form, the ear type resembles that of var. *nutans* but essential differences in the ear structure exist. Thus, among the distinctive characteristics of the new form are the notably broad glumes of the middle spikelets and their long outstanding awns which give the ear a whisk-like appearance, these awns being the same length as the awns on the lemma. The specimen is similar to, but not identical with, var. *Rehmii* Körnicke. It is almost identical morphologically with the X ray mutant of Gullkorn [Golden barley] with "lemma-like glumes" described by Gustafsson and Åberg; however the awns on the glumes in the lateral spikelets of Gustafsson's mutant are shorter or absent.

It is concluded that the Kluszkowce barley is probably a spontaneous mutant of var. *nutans*. Preliminary experiments indicated that the mutant showed an increase in grain yield of 7.6% and in 1000-corn weight of 8.7%; the protein content corresponds to 2.99% N.



3054 EHRENBERG, L.

**Factors influencing radiation induced lethality, sterility, and mutations in barley.**

Hereditas, Lund 1955 : 41 : 123-46.

In experiments conducted at Lund and Stockholm, Sweden, the lethal effects, sterility and mitotic disturbances caused by X irradiation of barley seeds were found to decrease with increasing water content of the seeds, within the range 8-18% water. The induced rate of mutation, as estimated from the frequency of chlorophyll mutants, was similarly dependent on moisture content up to 11.5% water; above this level seed moisture was without effect. The effects produced by fast neutrons were uninfluenced by seed moisture. Seeds which were dried, X-irradiated and subsequently germinated at 0°-10° C. showed a lower degree of sterility than those germinated at 10°-20° C. No temperature effects of this kind were observed among undried or soaked seeds when X irradiated.

3055 FREY, K. J. & HORNER, T.

**Comparison of actual and predicted gains in barley selection experiments.**

Agron. J. 1955 : 47 : 186-88.

"In a comparison between two methods of calculating heritability percentages using performance data from the  $F_4$  and  $F_5$  of two barley crosses, the parent-progeny regression method tended to underestimate the true heritability percentages while the components of variance method gave values which closely approximated the results obtained in selection experiments. Only for date of heading was there close agreement between the heritability percentages calculated by the two methods. Other characteristics measured were yield, test weight, and plant height.

"When the actual gains obtained through selection and those expected from the components of variance analysis were expressed as a percent of the population mean, the agreement was nearly perfect in all cases except test weight in the Stewart x Bay cross. In this case, the gain obtained was nearly twice as great as expected."

[Authors' summary].

3056 NILAN, R. A.

**Relation of carbon dioxide, oxygen and low temperature to the injury and cytogenetic effects of X-rays in barley.**

Genetics 1954 : 39 : 943-53.

Treatment of dormant seeds of the barley

Himalaya with 15,000 r. applied at the rate of 500 r. per min. resulted in a virtually constant frequency of seedling mutation for chlorophyll deficiency in the  $S_2$ , whether the seeds were irradiated in air, oxygen or carbon dioxide at ca. 20° C. or ca. -80° C. Radiation-induced injury, as measured by seedling height and survival to maturity, was reduced by low temperature but not affected by either of the gases. The frequency of gross chromosomal aberrations in  $X_1$  mitosis and meiosis was strikingly altered when irradiation took place at the low temperature or in the presence of either gas, compared with treatment in air at room temperature. The action of oxygen and carbon dioxide at room temperature increased the frequency of translocation, whereas the application of low temperature, alone or in combination with either oxygen or carbon dioxide, reduced the frequencies of interchange. It is suggested that the gas treatments and temperature conditions did not influence the primary breakage and point mutation due to irradiation but had a marked effect upon reunion.

3057 MOH, C. C., NILAN, R. A. & ELLIOTT, F. C.  
**An unusual association of two mutant characters in atom-bombed barley.**

J. Hered. 1955 : 46 : 35-40.

A mutant line of *Hordeum vulgare* 'Trebis' consisting of green, partially sterile plants gave rise upon selfing to an unusually high proportion (40%) of fertile yellow-green progenies. The parental mutant type was derived from a population exposed to atom-bomb radiation at Bikini in 1946. It was characterized by 29.4% ovule and 26.6% pollen abortion. Among the green plants constituting the remaining 60% of the progenies, three classes were found: (1) the parental type, (2) individuals showing little gamete abortion but when selfed segregating green and yellow-green plants in a 3 : 1 ratio, and (3) plants whose behaviour was normal in that they displayed hardly any gamete abortion and only gave rise to normal green offspring when selfed. When the parental type was crossed with plants of the variety Campana having a normal genic and chromosomal constitution, all the progenies were green, consisting of the three classes of plants described above. It is suggested that a small nonreciprocal translocation between non-homologous chromosomes had occurred in the irradiated material, gametes with a deficient chromosome ( $A_2$ ) and a normal representative ( $B_1$ ) being nonviable. The yellow-green effect was expressed in plants homozygous for the

translocated segment and may have been due to either the inhibition of normal gene action in the presence of the homozygous translocation or to a second deficiency associated with the translocation but which did not affect gamete viability.

3058 YAMAMOTO, T.

**(Studies on sterility in barley. V. Determination of the force involved in the dehiscence of the anther).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 78-82. [Japanese].

Low momentum (velocity x weight) of the pollen grains when they are expelled from the anther is an important cause of sterility in barley. The following technique was devised for measuring pollen-grain momentum. The velocity of the grains is computed from observations of the maximum distance to which they are ejected when the anther is caused to dehisce in a glass chamber. Pollen-grain weight is determined by either (1) subtracting the weight of an empty anther from the weight when full and dividing by the number of grains; or (2) ascertaining the specific gravity of the grains in graded mixtures of glycerine and water and multiplying by the volume.

3059 DAY, A. D., DOWN, E. E. & FREY, K. J.  
**Association between diastatic power and certain visible characteristics and heritability of diastatic power in barley.**

Agron. J. 1955 : 47 : 163-65.

At the Michigan Agricultural Experiment Station investigations were carried out on crosses of the barley OAC21, characterized by high diastatic activity, with varieties having low activity. Diastatic power in the cross OAC21 x Mars proved to be associated with the character of rough *vs.* smooth awns, determined by a gene belonging to linkage group V; the rough-awned segregates had a mean diastatic activity significantly higher than that of the smooth-awned segregates. An association was also detected, by means of the cross Alpha x OAC21, between diastatic activity and the condition of 2 rows *vs.* 6 rows, controlled by a factor in linkage group I; the 2-rowed segregates had a significantly higher mean activity than the 6-rowed types. No associations were detected between diastatic activity and the characters of (1) black *vs.* white hulls governed by a gene in linkage group II, (2) naked *vs.* covered kernels due to a gene in group III and (3) blue *vs.* white aleurone dependent upon a gene in group IV. Heritability

values ranging from 30 to 34% were obtained for diastatic power.

3060 CLONINGER, C. K. & POEHLMAN, J. M.  
**Resistance of winter barley to *Ustilago nuda* (Jens.) Rostr.**

Res. Bull. Mo. agric. Exp. Sta. 1954 : No. 560 : Pp. 35.

Information is given on the reactions of 58 varieties and selections when artificially inoculated with 4 or more of 34 collections of *U. nuda* from Missouri and nine other states. By means of the differentials North Carolina Hooded 26, B580 (Admire x Missouri Early Beardless), Dohadale (Korean introduction), Reno and two selections of Missouri Early Beardless (B351 and B405), the collections were divided into 13 physiological groups. Varieties of the single-awned and smooth-awned Tennessee types, together with the introduced commercial varieties commonly grown in the USA, were susceptible to all the collections with which they were tested. Good sources of resistance were found among hooded varieties of the Tennessee Beardless type or of similar origin, hybrid selections involving Missouri Early Beardless and among varieties from the USDA world collection. Barleys outstanding for resistance included North Carolina Hooded 26, Hooded 16, B351, B467 (selection of Kirsoku), B575 (Admire x Missouri Early Beardless), CI 4966 (Russian introduction) and B696 (Kentucky 2 x Missouri Early Beardless).

## MILLETS AND SORGHUMS

3061 PANDYA, P. S. & Chavan, V. M.

**A brief note on research work done on small millets in the Bombay state.**

Poona agric. Coll. Mag. 1954 (1955) : 45 : 125-26.

Promising selections of *Eleusine coracana*, *Setaria italica*, *Paspalum scrobiculatum*, *Panicum miliaceum* and *Panicum crus-galli* are noted.

3062 PANDYA, P. S. & CHAVAN, V. M.

**A brief note on research work done on bajri (*Pennisetum typhoideum*) in Bombay State.**

Poona agric. Coll. Mag. 1954 (1955) : 45 : 123-24.

Breeding since 1923 is briefly surveyed. Current work includes the development of inbreds for the purpose of exploiting heterosis and mass selection of local material. The strain 28-5, a selection from local material, and its hybrid



28-5 x AF3 have both outyielded local types.

- 3063 PANDYA, P. S. & CHAVAN, V. M.  
**Brief note on research work done on jowar (*Andropogon sorghum*) in Bombay state.**

Poona agric. Coll. Mag. 1954 : 45 : 71-74.

A brief account of early and recent breeding work is presented, and data are given on the planting and harvesting seasons, maturity, grain colour, yield and qualities of eight strains adapted to various districts. Selection of local material is in progress at regional stations.

- 3064 THURMAN, R. L. & STATEN, R. D.  
**Sorghum yield experiments, 1950-1954.**

Rep. Ser. Ark. agric. Exp. Sta. 1955 : No. 46 : Pp. 22.

A report is given of the results of tests carried out in Arkansas to study sorghum varieties for their value as producers of grain, silage or hay. Varieties of Sudan grass and pearl millet were also tested.

- 3065 African sorghum variety shows promise in crosses.

Sth. Seedsman 1955 : 18 : No. 2 : p. 74.

In Oklahoma, Short Kaura has been crossed with Redlan, White Martin and two kafir sorghums with the aim of obtaining an early-maturing dwarf plant with yellow endosperm. The ultimate object is to improve silage quality by incorporating the carotene factor into sweet sorghums.

- 3066 MUNKRES, K. D.  
**Hybrid grain sorghums. New horizons ahead!**

What's New Crops Soils 1955 : 7 : No. 4 : 18-19.

A popular account is given of the use of male-sterile lines in the production of hybrid grain sorghum at the Texas Agricultural Experiment Station.

- 3067 SAFEEULLA, K. M. & THIRUMALACHAR, M. J.  
**Resistance to infection by *Sclerospora sorghi* of sorghum and maize varieties in Mysore, India.**

Phytopathology 1955 : 45 : 128-31.

Of 21 sorghums inoculated with *S. sorghi*, the varieties Bonita, Honnur Bile, Kasturi Bile and CO6 remained uninfected. The maize variety Golden Beauty also showed resistance.

- 3068 DESAI, M. K. & CHAVDA, D. H.  
**Mite (*Oligonychus* sp.) as a causal agent for Ratada "disease" of sorghum.**

Poona agric. Coll. Mag. 1954 (1955) : 45 : 138-41.

Seedlings of 24 sorghum varieties tested in Surat, Bombay State, all proved to be susceptible when exposed to infection by *Oligonychus* under greenhouse conditions.

- 3069 Chinch bug resistance tested in sorghums.

Sth. Seedsman 1954 : 17 : No. 5 : p. 40.

In a seven-year trial conducted in Oklahoma, the grain variety showing highest resistance to chinch bug (*Blissus leucopterus*) was Kaferita CI 811 (cf. Abst. 305). African Millet was the most resistant forage variety, Wheatland and Martin the most resistant combine milos and Redland one of the most resistant kafirs.

## RICE

- 3070 (New varieties raised by the Ministry of Agriculture and Forestry in 1954. II. Rice).

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : p. 100. [Japanese].

Brief descriptions are given of the following new varieties: the early rices Hatsunishiki (Norin 22 [Ministry of Agriculture and Forestry 22] x Norin 1) and Chikuma (Tosan 38 x Ginbozuchusei [Midseason Silver Bonze]), the midseason variety Chiyokai, and the late midseason rice Nakasengoku (Tokaiasahi x Kinki 39).

- 3071 Annual Reports of the Central Rice Research Institute, Cuttack: Combined 1949-50, 1950-51 : Pp. 33; 1951-52 : Pp. 33; 1952-53 : Pp. 35.

Study of the genetic stocks which are maintained at the Cuttack Institute, Orissa, and which include wild and cultivated material from India and other countries continued. Genetic variability and the value of secondary selection in established varieties were investigated. Work carried out under the auspices of the FAO hybridization scheme is reported (cf. Absts. 2003 and 2006).

From studies of several crosses it appears that the inheritance of purple pigmentation in the leaf blade depends on three or four genes. In the natural hybrid Balunga Mardan, albinism and purple pigmentation were each monogenically determined, expression of the latter character being affected by the presence of an

inhibitor gene. In hybrids between green *japonica* and *indica* varieties, the production of pigmentation in the leaf sheath, auricle and other plant organs appears to be governed by two complementary genes, one carried by the *indica* and the other by the *japonica* parent. Linkage relationships have been established between factors controlling the pigmentation of apiculus, glume and auricle. A condition of the kernel described as notched is determined by a single gene *NK* and is inherited independently of factors governing pericarp colour and kernel scent. The multipistillate condition and the production of a fleshy protuberance on the ovary appear to be associated and are inherited as simple recessive characters.

Further work in progress includes: investigations on techniques of sampling and testing; studies on the photoperiodic responses of varieties (cf. Absts. 2004 and 2008); selection for adaptation to upland areas and to highly fertile soil conditions; and testing for resistance to blast, rice borers and other pests and diseases. Results of trials of varieties of different maturity periods are reported. The early varieties Ch. 45, As. 3 and R<sub>2</sub> Nungi have shown some drought resistance.

- 3072 RAJAGOPALAN, K.  
**A preliminary note on the study of inter-racial hybrids in rice.**  
 Madras agric. J. 1955 : 42 : 177-81.

The F<sub>2</sub> and F<sub>3</sub> of *japonica* x *indica* hybrids received from the Central Rice Research Institute, Cuttack, have been studied at the Paddy Breeding Station, Coimbatore. Some progenies combined good tillering capacity, thick culms, resistance to lodging and a high degree of fertility. F<sub>3</sub> hybrids responded favourably to heavy manuring.

- 3073 OKA, H.  
**(Studies on tetraploid rice. II. Variation between individuals in tetraploid rice).**  
 Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 18-25. [Japanese].

Further to his preliminary study of colchicine-induced polyploidy in rice (cf. *PBA*, Vol. XXIV, Abst. 2996), the author presents an analysis of intravarietal variation in successive generations of a series of colchicine-induced tetraploid strains of Far Eastern rice varieties. The principal characters studied were height, heading period and fertility. Considerable variation was observed between different lines of the same tetraploid strain. No marked

improvement in fertility in successive generations was noticed.

- 3074 OKA, H.  
**(Studies on tetraploid rice. III. Variation in various characters between varieties of tetraploid rice).**  
 Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 53-67. [Japanese].

The present paper of this series (cf. Abst. 3073) presents the results of comparisons between diploid and tetraploid strains of 74 Far Eastern varieties. In general the tetraploid strains were shorter and less drought-resistant and had fewer grains per panicle, fewer panicles per plant, a lower percentage germination and a lower germination rate, but longer panicles and awns, than the corresponding diploid strains. There were only slight differences between diploid and tetraploid strains in respect of heading date, response to photoperiod, resistance to the toxic action of KClO<sub>3</sub> and cold resistance.

Tetraploids of Continental varieties (cf. *PBA*, Vol. XXII, Abst. 2746) tended to be more fertile than Insular tetraploids.

- 3075 OKA, H.  
**(Studies on tetraploid rice. IV. Intervarietal F<sub>1</sub> hybrids of tetraploid rice).**  
 Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 101-08. [Japanese].

Observations on fertility and vigour in a series of F<sub>1</sub> hybrids of crosses between tetraploid strains of Far Eastern varieties are reported. The F<sub>1</sub> hybrids tended to exceed their parents in both fertility and vigour, especially in Continental x Insular varietal combinations (cf. *PBA*, Vol. XXII, Abst. 2746).

- 3076 OKA, H.  
**(Varietal differences in sensitivity to light, sensitivity to temperature and number of days in the growth period in rice varieties. Phylogenetic differentiation of cultivated rice. III).**  
 Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 92-100. [Japanese].

In continuation of his earlier researches (cf. Abst. 2017), the author reports investigations on the effect of photoperiod and temperature on the vegetative period of 163 eastern Asiatic varieties. Sensitivity to photoperiod was determined by finding the maximum reduction in vegetative period that resulted from curtailing day length at the time of flower-bud initiation to various extents. Temperature sensitivity



was measured from observations on the extent to which growth rate and time of flower-bud initiation were reduced by rise in temperature; only light-insensitive varieties were used for this purpose.

With regard to light sensitivity, two varietal groups, a sensitive and an insensitive group, could be distinguished. Northern and tropical varieties were insensitive; varieties in the intervening zone pertained to both groups. Sensitivity among the sensitive varieties was greatest in those from low latitudes.

In the varieties placed by the author in his Continental group, growth was accelerated to a greater extent and the time of flower-bud initiation accelerated to a lesser extent with rise in temperature than in varieties placed in the Insular group. In general, the growth period of light-insensitive varieties was greatest in those from low latitudes.

- 3077 OKA, H.  
**(Varietal differences in the response of rice to fertilizers. Phylogenetic differentiation of cultivated rice. IV).**  
 Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 101-10. [Japanese].

The relative responses to NPK fertilizers of varieties pertaining to the Continental, Temperate Insular and Tropical Insular groups defined by the author (cf. Abst. 309) are described. The increase in ear and tiller number following application of fertilizers tended to be in the order Temperate Insular > Tropical Insular > Continental. High temperature reduced the response to fertilizers, especially in the Continental varieties. Increase in plant height at the tillering stage due to fertilizers tended to be greater in Continental varieties, especially when temperature was high. Increase in ear length and number of grains per ear following application of fertilizers was somewhat higher in Continental varieties. Fertilizers brought about an increase in ear number principally in varieties with a short vegetative period; the response was low in Continental varieties sensitive to photoperiod.

- 3078 OKA, H.  
**(Intervarietal differences in the minimum temperature for germination and the temperature constant of rice grains. Phylogenetic differentiation of cultivated rice. V).**  
 Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 140-44. [Japanese].

A series of Far Eastern varieties was tested for

the minimum temperature necessary for germination (the lowest temperature at which a germination percentage of 50% was reached within 20 days) and the response of germination to temperature (measured by the regression of number of days required for germination on temperature, both converted to a logarithmic scale).

The minimum temperature was generally higher in the varieties of the Continental group (cf. *PBA*, Vol. XXII, Abst. 2746) than in those pertaining to the Insular group. Within a group, the minimum temperature was lower in varieties from higher latitudes.

The response of germination to temperature was more marked in the case of the Continental varieties, and especially in varieties sensitive to photoperiod. A positive correlation was found between response of germination to temperature and response of general growth to temperature; a negative correlation subsisted between response of germination to temperature and the degree of acceleration of flower-bud initiation due to increased temperature (cf. *PBA*, Vol. XXIV, Abst. 2998).

- 3079 OKA, H.  
**(Intervarietal differences in the response of tillering, culm length etc. in rice to temperature. Phylogenetic differentiation of cultivated rice. VII).**  
 Ikushugaku Zasshi/Jap. J. Breeding 1955 : 4 : 213-21. [Japanese].

The influence of temperature on tillering rate and period, tiller number, elongation rate, culm length and ear length in some 120 Far Eastern varieties was investigated.

Positive correlations existed between the responses of tillering rate and tiller number to temperature, and also between the responses of tillering period, elongation rate, culm length and ear length to temperature; negative correlations existed between characters pertaining to the first and second of these groups, respectively. In Continental varieties (cf. *PBA*, Vol. XXII, Abst. 2746), acceleration of tillering rate with rise in temperature was higher and the degree of curtailment of the tillering period was lower than in Insular varieties. In some Continental varieties sensitive to photoperiod, tiller number increased with rise in temperature in contrast to the usual situation where the shortening of the tillering period with rise in temperature leads to a reduction in tiller number.

Acceleration in elongation rate with rise in temperature was higher in Continental varieties

and this characteristic was correlated with the effect of temperature on the time required for germination (cf. Abst. 3078).

3080 MISRA, G.

**Photoperiodism in rice. V. Response of two early-winter varieties to short-day photo-periods given after transplantation.**

J. Indian bot. Soc. 1955 : 34 : 53-66.

In experiments at Ravenshaw College, Cuttack, the late varieties T36 and T23 were exposed to 10-hour photoperiods when the seedlings were 30, 40, 50, 60, 70 and 80 days old. In general the reduction in the time taken from sowing to ear emergence became less as the age at which treatment commenced became greater, but T23 showed less sensitive responses than T36.

3081 MISRA, G.

**Photoperiodism in rice. VI. Effect of long day length on three medium-early varieties of rice of Uttar Pradesh.**

J. Indian bot. Soc. 1955 : 34 : 67-71.

The effects of a 24-hour photoperiod upon the varieties T3, T12 and T21 were investigated. When one-week old seedlings were treated for 3 weeks, all three varieties displayed a slight increase in earliness of ear emergence compared with the controls. Exposures for 4, 5 or 6 weeks caused delay in flowering except in the case of T21 when treated for 4 weeks. The effects of long-day conditions upon various components of yield are analysed.

3082 SYAKUDO [SHAKUDO], K., KAWASE, T. & YOSHINO, K.

**[Studies on quantitative inheritance. XIII. A. Rice. (b)\* Studies on the inheritance of and quantitative function of the genes determining heading period. (2) On the quantitative function of the genes  $E_3$ ,  $E_4$  and  $E_5$ .]**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 83-90. [Japanese].

Continuing their studies on the inheritance of heading period (cf. Abst. 308), observations were made on the  $F_1$  to  $F_4$  of Aikoku [Patriotism] x Ginbozu [Silver Bonze], Kyotoasahi [Kyoto Rising Sun] x Aikoku and Kyotoasahi x Ginbozu. Heading period was determined by the three loci  $E_3$ ,  $E_4$  and  $E_5$ .  $E_3$  and  $E_4$  appear to be dominant and  $E_5$  imperfectly dominant. The effects of the three factors are cumulative

though the genes appear to interact.  $E_3$ ,  $E_4$  and  $E_5$  also control culm height.

3083 YAMADA, I. & HOZUMI, K.

**(A technique for the artificial germination of rice pollen).**

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 22 : Nos. 3 & 4 : 103-04. [Japanese].

Media consisting of starch paste and sucrose have proved more useful than the standard sucrose-agar media for the germination of rice pollen.

3084 NAGAO, S. & TAKAHASHI, M.

**(Studies on rice hybridization. XVIII. Some observations on cleistogamous rice).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 135-39. [Japanese].

Descriptions are given of two cleistogamous rice strains. Cleistogamy is determined by the single recessive gene *cls*. It was associated with dwarf habit, but in the  $F_3$  of a cross between cleistogamous and chasmogamous rice, these two characteristics segregated. Linkage was detected between *cls* and *d<sub>6</sub>* (lop-leaved dwarf), the recombination value being 39%.

3085 MASON, R. R.

**Introduced varieties of rice.**

Agric. J. Fiji 1954 : 25 : 103-05.

The main results of tests of introduced varieties in Fiji are briefly surveyed. Quite a number of the more promising varieties have originated from British Guiana and Malaya. With the possible exception of Bluebonnet 50, all the introductions from the USA have given a disappointing performance.

3086 SHIMAZAKI, Y.

**(On tapetal hypertrophy observed in rice varieties grown in the Tohoku region).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 122-26. [Japanese].

Tapetal hypertrophy consequent on irrigation with cold water, similar to that observed earlier by Sakai in Hokkaido (cf. *PBA*, Vol. XIX, Abst. 307), has been noted by the author in the north-eastern region of the main island of Japan. The abnormality was also induced experimentally by subjecting plants to a temperature of 12° C. for 48 hr. Varietal differences in the degree of tapetal hypertrophy were noted, varieties less affected being more resistant to the deleterious action of cold irrigation water.

\* Probably a typographical error for (d).



- 3087 BABA, I., TAKAHASHI, Y. & IWATA, I.  
(Studies on the nutrition of rice with reference to susceptibility to *Cochliobolus miyabeanus*. VIII. The influence of hydrogen sulphide on the growth and susceptibility to *C. miyabeanus* of rice varieties).  
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 23 : No. 1 : 10-15. [Japanese].

Five Japanese varieties were compared for their degree of tolerance of H<sub>2</sub>S in culture solution. Norin 37 [Ministry of Agriculture and Forestry 37] was the variety least affected; this variety is also highly resistant to *C. miyabeanus* (*Helminthosporium* leaf spot) and to autumn drop.

- 3088 MELLO-SAMPAYO, T. & SILVA, M. V. E  
Ensaio preliminar sobre a determinação de resistência de algumas formas cultivadas de arroz à *Piricularia oryzae* Br. et Cav. (Preliminary studies on the determination of the resistance of some cultivated forms of rice to *P. oryzae* Br. et Cav.).  
Comiss. Regul. Comérc. Arroz, Lisboa 1954 : No. 21 : Pp. 38.

A brief review of existing information on rice blast is presented. A series of rice varieties comprising those of most interest for growing in Spain and Portugal was tested by artificial inoculation of the seedlings with a Portuguese culture of the fungus and the results are tabulated. Most of them were susceptible but certain varieties displayed a lower degree of infection than the rest and these are listed; they include members of *Oryza glaberrima* and *O. minuta* and a number of cultivated rices from Madagascar and other tropical countries.

- 3089 DEL PRADO, F. A.  
De *Piricularia* ziekte van rijst in Suriname. (The *Piricularia* disease of rice in Suriname).  
Surinaam. Landb. 1955 : 3 : 38-41.

Information on the comparative susceptibility of seven varieties to *Piricularia oryzae* is included. In trials at the Paramaribo Agricultural Research Station, 5ML 77/1/3 proved moderately resistant.

- 3090 ORSENIGO, M.  
Comportamento di varietà italiane alla malattia "white tip." (The behaviour of Italian varieties in regard to "white tip" disease).  
Riso, Milano 1955 : 4 : No. 5 : 15-17.

Greenhouse experiments were carried out in

1951-52 and in 1952-53 by the writer, while in the USA, to test the resistance of 14 Italian varieties of rice to white tip caused by the nematode *Aphelenchoides oryzae*. The results, judged on a 5-point scale, showed that only Rinaldo Bersani possessed good resistance, while Allorio Bellardone, Balilla and Sesia were susceptible, though not as markedly so as the remaining varieties.

## FORAGE GRASSES

- 3091 STRANDE, K.  
Beitebruk og beiteforskning i Storbritannia. (Grassland farming and grassland research in Great Britain).  
Tidsskr. norske Landbr. 1955 : 85-118.

In the section on grassland research, the methods used at the Welsh Plant Breeding Station, Aberystwyth, and at other stations in Great Britain in breeding and testing new and improved varieties of pasture plants are outlined and brief reference is made to work on intergeneric crosses between grasses and the inheritance of disease resistance, earliness and other characters.

- 3092 STEVENSON, T. M.  
What is being done in the development of grasses and legumes.  
Agric. Inst. Rev. 1955 : 10 : No. 2 : 42-44.

Current breeding objectives in forage grasses, lucerne, red clover and sweet clover at Ottawa, Ontario, and other regional stations are surveyed (cf. Absts. 2848 and 2850).

- 3093 Annual report of progress in forage crops research in Oklahoma 1954 : Pp. 33. (Mimeographed).

*Cynodon dactylon*. The Bermuda-grass variety Greenfield was released (cf. *PBA*, Vol. XXIV, Abst. 3035).

*Phalaris*. *Ph. arundinacea* and *Ph. tuberosa* show promise as material from which it may be possible to develop an adapted, hardy cool-season grass.

*Andropogoneae*. Information is given on the chromosome numbers and behaviour of a large number of species belonging to the above tribe. Further study of *Bothriochloa* (= *Andropogon*) *ischaemum* has shown that the 4n forms occur chiefly in Europe and the Middle East, the hexaploids being most frequent in the Far East (cf. *PBA*, Vol. XXV, Abst. 1119). The variety King Ranch is the only pentaploid type found so far. The tetraploids and four of the hexaploids show only minor irregularities during meiosis, whereas in King Ranch and certain

hexaploids meiosis is extremely irregular. *B. radicans* is a tetraploid with fairly normal meiosis; the plant previously reported to have  $2n = ca. 1000$  was unusual. *B. pertusa*, *B. decipiens*, *B. glabra*, *B. caucasica* and (?) *B. venusta* were found to be tetraploids. *B. intermedia* was represented by both  $4n$  and  $6n$  forms; *B. insculpta* proved to be hexaploid. Accessions of *Dichanthium annulatum* from Africa, India and the Middle East were tetraploids, with the exception of one  $2n$  specimen from Calcutta.

Interspecific crosses were attempted within the *Bothriochloa-Dichanthium* complex. Breeding of Indian grass and sand bluestem continued.

***Buchloe dactyloides*.** A synthetic of buffalo grass is being increased for extensive testing. Sex inheritance is under investigation.

**Other grasses.** Breeding work on blue panic, switchgrass, sideoats grama, creeping lovegrass, bromegrass and wheatgrass is briefly reported.

***Medicago*.** In an unfavourable season, a few plants among the Turkish wild population grew well, showing considerable underground crown development.

- 3094 Production et distribution des semences aux Etats-Unis et en Grande-Bretagne (rapports de mission). [**Seed production and distribution in the United States and Great Britain (report of the commission)**].  
Bull. tech. Ing. Serv. agric. 1955 : No. 97 : 77-199.

This report of a commission sent by the French Agricultural Advisory Services to study methods of seed production in the USA and Great Britain includes chapters on the breeding and bulking of new varieties, seed certification and methods undertaken to avoid the contamination of seed stock of authorized varieties. The commission was interested primarily in forage grasses and leguminous forage plants but, in the section concerned with agricultural practices in the USA, brief mention is also made of the breeding and certification of new varieties of cereals, root crops and vegetables.

- 3095 YAMADA, K. & ADACHI, A.  
(**Flowering habit and artificial germination of the pollen in some forage plants**).  
Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 23 : No. 1 : 55-59. [Japanese].

Data are included on the optimum sucrose concentrations for media for germinating pollen

of species of *Sorghum*, *Lolium*, *Trifolium* and *Melilotus*.

- 3096 **Report of the third meeting of the working party on Mediterranean pasture and fodder development at the University of Ankara, Turkey, 24 to 31 May 1954.**

FAO UN, Rome 1954 : Pp. 30.

Among the activities discussed were (1) tests of pasture and fodder species in the uniform Mediterranean nurseries and (2) the joint plant exploration and collection mission being conducted by FAO and the Commonwealth Scientific and Industrial Research Organization of Australia to obtain useful grasses and legumes.

- 3097 KÖHNLEIN, J., FISCHER, R. & WEISSENBERG, H.

Über die Ausdauer von Hochzuchtgräsern auf dem Dauergrünland. (**On the persistence of pedigree grasses in permanent pastures**).

Z. Acker- u. PflBau. 1955 : 99 : 294-314.

The results of investigations carried out by the Federal Research Institute for Dairy Produce, Kiel, on the extent to which pedigree varieties of pasture grasses resist encroachment by indigenous grasses of the same species growing in neighbouring fields are presented. After approximately 10 years from the date of sowing, pastures containing pedigree varieties of meadow fescue or red fescue were fully adapted to their surroundings and no encroachment by wild strains was evident. In the case of smooth-stalked meadow grass and timothy, somewhat contradictory results were obtained. In some fields the pedigree strains had almost disappeared; in others little contamination was observed. Fields planted with perennial ryegrass exhibited some evidence of encroachment by wild strains but the pedigree varieties still predominated.

- 3098 **New Potomac orchardgrass is announced; excels in rust resistance and leafiness.**

What's New Crops Soils 1954 : 7 : No. 3 : p. 23.

The cocksfoot variety Potomac, developed by the Agricultural Research Service of the USDA, has proved superior to commercial strains in rust resistance, leafiness, persistence and spring and autumn vigour. It matures 2-3 days later than commercial cocksfoot.

- 3099 BRIDGMAN, F. & WOODWARD, R.

**Two promising new cocksfoots.**

J. Agric. W. Aust. 1955 : 4 : 157-59.

The varieties Currie (*Dactylis glomerata*) and



Neptune (*D. maritima*) show promise for use under nonirrigated conditions in the south-western dairying districts in Western Australia. They originated as introductions from Algeria and Portugal respectively. Now in the final stages of testing, they may shortly be released to farmers.

- 3100 OLDEMEYER, D. L. & HANSON, A. A.  
**Evaluation of combining ability in orchardgrass *Dactylis glomerata* L.**  
Agron. J. 1955 : 47 : 158-62.

Seven early and five late-maturing clones were used in the investigation of methods of evaluating combining ability, tests being carried out on (1) their progenies from a "wide" polycross nursery consisting of 112 clones, (2) restricted polycrosses within each of the two maturity groups, (3) single crosses obtained by interplanting the parents in all possible combinations within the early and late groups, and (4) tiller plots of the parents. Significant correlations for both yield and height were obtained between the parents and different types of progeny, using the average yields for the two years of testing. Broadcast seedlings appeared to be more satisfactory in testing than spaced plantings. In evaluating general combining ability, little difference was found between the effectiveness of the wide polycross and restricted polycross tests. Although the average yield of the single-cross progenies from all the parents was significantly correlated with parental and polycross yields, considerable variation occurred among the crosses of individual parents. The correlation coefficients among parents and progenies with respect to susceptibility to leaf diseases were highly significant, except for the correlations involving the average rating for the restricted polycross progenies. Differences in susceptibility to leaf diseases were more easily detected in broadcast plots than in spaced plantings. Preliminary investigations suggested that use of greenhouse tests of seedling vigour as a means of predicting progeny performance in the field should be further studied.

- 3101 FORTMANN, H. R.  
**Forage crop breeding at Penn State.**  
Sci. Fmr., Pa. 1955 : 2 : No. 4 : 8-9.

At the College of Agriculture, Pennsylvania University, synthetic varieties of cocksfoot have been bred. Work on brome grass includes participation in the cooperative testing of synthetics developed in the north-eastern states. The value of selections from hybrids between reed canarygrass and Harding grass is being explored.

- 3102 HILL, H. D. & CARNAHAN, H. L.  
**Effects of variables in weather and their interactions on metaphase cells in root tips of grasses.**  
Bot. Gaz. 1954 : 116 : 82-86.

In investigations on potted plants of *Dactylis glomerata* and *Festuca elatior* at the US Regional Pasture Research Laboratory, State College, Pa., it was found that with a greenhouse temperature of 65° F. sunny or cloudy weather had little measurable effect upon mitotic activity in the root tips, such activity being estimated by counts of cells at metaphase. With a temperature of 75° F., the root tips collected on cloudy days showed a greater number of metaphase cells than those obtained on sunny days, the greatest number being found in root tips collected in cloudy weather at 13.00 hr. The single clone of meadow fescue studied was less influenced by environmental variables than the two clones of cocksfoot.

- 3103 LACKAMP, J. W.  
**On the determination of harshness in plants of cocksfoot (*Dactylis glomerata*).**

Euphytica, Wageningen 1955 : 4 : 31-33.  
Since the number, size and position of the teeth on the margins of cocksfoot leaves vary and since there is no correlation between tooth number and SiO<sub>2</sub> content of the leaves, it is suggested that, for the purpose of selection, the degree of roughness, which is conditioned by both these characters, should be assessed by chemical analysis followed by tooth counts of those plants with low SiO<sub>2</sub> content.

- 3104 VAN DIJK, G. E.  
**The influence of sward-age and management on the type of timothy and cocksfoot.**

Euphytica, Wageningen 1955 : 4 : 83-93.  
In a study carried out in the Netherlands, it was found that timothy plants from old grasslands were generally later in heading, leafier and more erect than those from young grasslands. Similar but less marked differences were found among cocksfoot populations from fields of different ages. In neither case did management appear to have a selective influence on plant type.

- 3105 HARLAN, J. R.  
**Southland brome grass. A new variety for Oklahoma conditions.**  
Bull. Okla. agric. Exp. Sta. 1954 : No. B-444 : Pp. 7.

Further information on the brome grass Southland, a synthetic derived from five open-pollinated lines, is given (cf. *PBA*, Vol. XXIV, Abst. 1153).

3106 HALL, B. M.

**Genetic analysis of interspecific hybrids in the genus *Bromus*, section *Ceratochloa*.**

Genetics 1955 : 40 : 175-92.

Investigations were carried out on the diploid and allotetraploid forms of *B. catharticus* x *B. haenkeanus* and *B. haenkeanus* x *B. stamineus*, the allotetraploids being obtained by colchicine treatment of  $F_1$  plants. All lines of descent were selected for fertility from the  $F_1$  and  $C_1$  to the fourth generation. Of the four  $F_1$  populations examined, representing the two diploid hybrids, three regularly formed 21 bivalents at metaphase I; in the fourth, a hybrid of *B. haenkeanus* x *B. stamineus*, 20 bivalents and a ring of 4 were observed in 70% of the cells, the remainder of which displayed regular pairing. The average frequency of quadrivalents per cell in the allotetraploids at metaphase I varied from 4.1 to 7.8, most of the associations formed being bivalent. The diploids, initially highly sterile, approached full fertility by the  $F_4$ , but the allotetraploids, originally approximately 80% fertile, showed a gradual increase in sterility in succeeding generations, in spite of selection for fertility. Correlation data suggested that the genes for fertility and those determining morphological differences between the species were linked. The sterility in the  $F_1$  and later generations is ascribed to the effects of cryptic structural hybridity. Heterogenetic pairing is regarded as the primary cause of the decline in fertility of the allotetraploids, evidence of a certain amount of preferential pairing being obtained.

3107 FEJER, S. O.

**Genotype-environment interactions in *Lolium perenne*.**

Nature, Lond. 1955 : 175 : 944-45.

Progenies of *L. perenne* selected for high and low green weight (tiller number x tiller weight) showed significant interactions between genotype and light intensity or temperature in glasshouse tests. The problem of estimating genotype-environment interactions in breeding pasture crops is discussed. In selection the effect of spacing upon performance should be considered.

3108 ESSAD, S.

**Contribution à la systématique du genre *Lolium*. (Contribution to the systematics of the genus *Lolium*).**

Ann. Inst. nat. Rech. agron., Paris 1954 : Sér. B : 4 : 325-51.

At the Central Station of Genetics and Plant

Breeding, Versailles, two main groups, the one comprising the allogamous species *L. perenne*, *L. multiflorum* and *L. rigidum* and the other the autogamous species *L. temulentum* and *L. remotum*, could be distinguished by a morphological study of a number of quantitative characteristics. Although morphological differences were ascertained within these groups, they were not sufficiently rigid to permit a clear-cut distinction, except in the case of *L. perenne* and *L. rigidum*, which could be distinguished from *L. multiflorum* by the length of their glumes. A cytogenetical study of the chromosomes showed that the five species could be readily distinguished by the shape and size of chromosome I, a comparison of its length with that of chromosome IV and the position of the secondary constriction in chromosome I. On this basis the species were divided into three groups, comprising *L. temulentum* and *L. remotum*; *L. perenne* and *L. multiflorum*; and *L. rigidum*, the chromosomes of the last-named species bearing a closer resemblance to those of the second group than to those of the first. In interspecific crosses, all the progeny of *L. perenne* (resistant to rust) x *L. rigidum* (resistant to drought) proved susceptible to *Puccinia glumarum* and *P. coronata*. Crosses between *L. remotum* x *L. temulentum* were male sterile.

3109 New *Zoysia* hybrid for southeast.

Seed World 1955 : 76 : No. 7 : p. 46.

The *Zoysia* hybrid Emerald is being released by the Georgia Crop Improvement Association, Athens, Ga. Developed from a cross between *Z. japonica* and *Z. tenuifolia*, it has derived its winter hardiness, compact habit and ability to spread quickly from the former parent and its dark green colour, density of growth and fineness of leaf from the latter.

3110 FORBES, I., ROBINSON, B. P. &amp; LATHAM, J. M.

**Emerald zoysia—improved hybrid lawn grass for the south.**

Mimeogr. Ser. Ga. agric. Exp. Sta. 1955 : No. 10 : Pp. 7. (Mimeographed).

Detailed information is given on the *Zoysia* variety Emerald (cf. Abst. 3109).

3111 PICKETT, R. C.

**Sudangrass in Kansas.**

Circ. Kans. agric. Exp. Sta. 1954 : No. 311 : Pp. 24.

This circular includes further information on the variety Greenleaf (cf. *PBA*, Vol. XXIV, Abst.



2079) which originated from the cross (Leoti x Sudan 2) x (Leoti x Sudan 4).

- 3112 RAMAN, V. S. & KRISHNASWAMY, N.  
**A chromosomal chimera in *S. halepense* (Linn.).**

Indian J. agric. Sci. 1955 : 25 : 47-50.

The occurrence of diploid tillers ( $2n = 20$ ) resulting from somatic reduction in a tetraploid plant ( $2n = 40$ ) of *Sorghum halepense* from Humpi, Madras, is reported. The chimera differed from the parental plant in having broader leaves of lighter colour, thicker stems, smaller pollen grains and no awns; it was also later in flowering. Meiosis in the tetraploid was regular, 20 bivalents being formed; in the diploid chimera, meiosis resembled that of naturally occurring diploids and showed no irregularities.

- 3113 MEHRA, K. L.  
**Chromosome races in *Chrysopogon montanus*.**

Curr. Sci. 1955 : 24 : 95-96.

One octoploid ( $n = 40$ ) and five diploid strains ( $n = 10$ ) have been identified at the Indian Agricultural Research Institute, New Delhi. The  $8n$  race is distinguishable from the  $2n$  by its deep green leaves, longer and more lax inflorescence, and larger spikelets, florets and anthers. Both forms showed regular meiosis and a high degree of pollen fertility; the  $8n$  race is probably an allopolyploid.

- 3114 SNOWDEN, F. L. S.  
**The wild fodder sorghums of the section *Eu-Sorghum*.**

J. Linn. Soc. 1955 : 55 : No. 358 : 191-260.

The section *Eu-Sorghum* is divided into the two subsections *Arundinacea*, in which the somatic chromosome number is usually 20, and *Halepensis*, in which it is usually 40. Full botanical descriptions are given of the four species of the latter group and of the 17 species contained in the series *Spontanea* of the former group. Diagnostic characters are noted and the affinities, distribution and uses of each species are surveyed. A key to all the species is provided.

- 3115 QUINBY, J. R. & KAPER, R. E.  
**Sudan's 45 years in America.**

Sth. Seedsman 1954 : 17 : No. 7 : 28-29.

The history of Sudan grass breeding in the USA is outlined and some of the more important varieties are described, including Sweet Sudan (cf. *PBA*, Vol. XIII, Abst. 1261), Piper (cf. *PBA*, Vol. XIX, Abst. 1835) and Greenleaf (cf. *PBA*, Vol. XXIV, Abst. 2079). The chief

breeding objectives are distinctive seed colour, resistance to foliage diseases, low prussic acid content and cytoplasmic male sterility.

- 3116 **Did you say Johnson grass ?**

Sth. Seedsman 1954 : 17 : No. 11 : 54, 117.

*Sorghum alnum*, a natural hybrid of *S. halepense* and *S. vulgare* from Argentina, is a vigorous, productive and drought-resistant perennial. It has done well as a forage crop in trials conducted at San Antonio, Tex.

- 3117 **Results of tests on buffel reported by Texas station.**

Sth. Seedsman 1955 : 18 : No. 2 : p. 52.

Of five strains of *Pennisetum ciliare* tested over the period 1952-54, T-4701, a tall, coarse type with underground runners, gave the highest yield of air-dried forage.

- 3118 NARAYAN, K. N.  
**Cytogenetic studies of apomixis in *Pennisetum*.**

Proc. Indian Acad. Sci. 1955 : Sect. B : 41 : 196-208.

In a cytological study of two aneuploid varieties ( $2n = 36$ ) of *P. clandestinum*, Rongai, which is male sterile and has unexserted stamens, showed irregularities of microsporogenesis resulting in abortive pollen formation, while Kabete showed normal development and produced fertile pollen and exserted anthers. The fact that both haploid and unreduced aposporous embryo sacs are formed in both varieties, together with the observation that Rongai set seed only when pollinated with normal Kabete pollen and that such seeds gave rise to fully fertile hybrids and to plants resembling the female parent, indicates that Rongai is a pseudogamous facultative apomict. It is suggested that male sterility is governed by a single recessive gene *t*.

- 3119 STEBBINS, G. L.  
**Experimental origin of a reproductively isolated population in the grass genus *Elymus*.**

Science 1955 : 121 : p. 625. (Abst.).

The species *E. glaucus* consists of a large number of taxa which form sterile hybrids when intercrossed. Some of these genetic microspecies can be distinguished morphologically. Many vary in the direction of other species with which *E. glaucus* forms natural hybrids, particularly *Sitanion jubatum* and *S. hystrix*; it has therefore been postulated that such taxa originated by back-crossing of highly sterile natural interspecific hybrids. To test this hypothesis, the artificial  $F_1$  hybrid of *E. glaucus* x *S. jubatum* was interplanted with the *E. glaucus* parent.

From 150,000 florets harvested from the hybrid, four back-cross plants were obtained; three were sterile and the remaining one had a 10% seed set. After two generations of selfing, this plant gave rise to highly self-fertile progeny, resembling *E. glaucus* in morphology and chromosome number but possessing a few characteristics suggestive of *S. jubatum*. When this progeny was crossed with the *E. glaucus* parent of the original hybrid, the  $F_1$  was highly sterile. The artificial microspecies thus obtained owed its differentiation, it is suggested, to the segregation of small differences in chromosome structure which were the basis of the sterility of the  $F_1$  *E. glaucus* x *S. jubatum* hybrid.

3120 HUNZIKER, J. H.

**Artificial and natural hybrids in the Gramineae, tribe Hordeae. VIII. Four hybrids of *Elymus* and *Agropyron*.**

Amer. J. Bot. 1955 : 42 : 459-67.

Descriptions of the morphology and cytology of hybrids involving the North American species *E. glaucus* and *A. spicatum* and the hexaploid Argentine species *E. patagonicus*, *A. agroelymoides* and a taxon designated *A. 'Calmuco'* are given. Cytological analysis of hybrids involving *A. agroelymoides* is rendered complicated owing to the high incidence of autosyn- desis among the chromosomes of this species. It seems however that this species and *A. 'Calmuco'* have a genome in common. There also appears to be at least partial homology between one of the genomes of *A. agroelymoides* and corresponding genomes in *E. glaucus* and *A. spicatum*. All the hybrids were heterozygous for inversions.

*A. agroelymoides* and *A. 'Calmuco'* were the taxa most closely related. *A. agroelymoides* appears to be a segmental allopolyploid. It is suspected that *A. 'Calmuco'* and *E. patagonicus* may include *Hordeum* spp. among their ancestry.

3121 ZIZIN [CICIN], N. V. & PETROWA [Petrova], K. A.

*Elymus* und seine biologischen Besonderheiten. (***Elymus* and its biological features**).

Züchter 1955 : 25 : 163-68.

This article constitutes a translation into German of the relevant section of the book entitled "Distant hybridization of plants." The geographical distribution and economic value of *E. giganteus* and *E. arenarius* are discussed and intergeneric hybrids obtained in the USSR by crossing one or both of these species with wheat, barley and rye are described.

3122 MAŠTAKOV, F.

**(A highly productive *Agropyron* variety).**

Zemledelie (Agriculture) 1955 : No. 3 : 103-05. [Russian].

Karabalyk 202, selected from a wild Kazah form of *A. cristatum*, is briefly described. It is hardy, drought-resistant and may yield up to 71.3 c. hay and 10 c. seed per ha.

3123 LAUMONT, P., GUEIT, M. & L'HERMITE, M.

Notes sur le comportement en Algérie de quelques espèces fourragères du genre *Agropyrum*. (**Notes on the behaviour in Algeria of some forage species of the genus *Agropyron***).

Ann. Inst. agric. Algér. 1954 : 8 : No. 5 : Pp. 40.

Brief morphological descriptions of six species of *Agropyron* introduced into Algeria from the USA are given, together with details of their geographical distribution in North America. *A. elongatum*, a high-yielding; drought and frost resistant species of early maturity and persistent growth habit, is adjudged the most suitable for cultivation under Algerian conditions.

## LEGUMINOUS FORAGE PLANTS

3124 LARSEN, K.

**Cytotaxonomical studies on the Mediterranean flora.**

Bot. Notiser 1955 : 108 : 263-75.

The following are among the chromosome numbers reported for samples collected in southern Italy: *Astragalus glycyphyllus*,  $n = 8$ ; *Medicago orbicularis*,  $2n = 16$ ; *Melilotus neapolitanus*,  $2n = 16$ ; *Onobrychis caputigallae*,  $2n = 14$  or  $21$ ; *O. tommasinii*,  $n = 7$ ; *Trifolium procumbens*,  $n = 7$ ; *Vicia bithynica*,  $2n = 14$ ; *V. ochroleuca*,  $n = 6$ ; and *V. pseudo-cracca*,  $n = 7$ .

3125 STATEN, G., JONES, H. D. & WILLIAMS, D. H.

**Alfalfa varieties for New Mexico.**

Bull. N. Mex. agric. Exp. Sta. 1953 : No. 381 : Pp. 16.

The results of tests of lucerne varieties, chiefly from various parts of the USA, are reported. New Mexico Common is recommended for hay production in the southern half of the state; Ranger is suitable for the middle Rio Grande and higher valleys. Buffalo, Ranger, Atlantic and Williamsburg are recommended for commercial seed production in all areas.



3126 SINSKAJA, E. N.

**(Disease resistance of lucerne depending on plant constitution, conditions of growth and processes of senescence and rejuvenation).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 3-18. [Russian].

The  $F_1$  generation of a cross between the Armenian and Mediterranean ecotypes of *Medicago sativa* showed a greater resemblance to the Armenian type but some plants showed slight deviation towards a more erect habit; these deviations were not however associated with any symptoms of disease or the conditions of reduced vitality known as degeneration.

The  $F_1$  of crosses between the Yemen and the wild Armenian mountain ecotypes resembled the Armenian in all but early flowering, a character of the Yemen type, and the  $F_2$  segregated into two main types, one late and erect, the other prostrate and early; a large proportion of the  $F_2$  plants became more erect after the first cut. When a cultivated Armenian submontane ecotype was used as pollen parent the segregation in the  $F_2$  was more complex but again the Armenian type predominated and no individuals of the pure Yemen type appeared; those that most closely approached it were low in vitality and soon died. The erect segregates were less healthy than the pure prostrate segregates.

In crosses of wild *M. falcata* from the Kubanj with *M. sativa* from Kašgar, the  $F_1$  plants showed a tendency towards degeneration like the Kašgar parent but to a lesser degree; this tendency was greater in the  $F_2$  and greater still in the  $F_3$ . The  $F_2$  plants could be separated into a group resembling *M. sativa*, another resembling *M. falcata* and intermediate groups, the first-named group being the least healthy. A Greek form of *M. sativa* crossed with the Kubanj *M. falcata* gave an  $F_2$  in which most plants showed degeneration like the Greek parent; the two healthy plants resembled the intermediate group in the previous cross; similar plants were also obtained from a cross of a presumed hybrid *M. falcata* x *M. sativa* with a Central Asian form of *M. sativa*. *M. hemicycla* ( $2n = 16$ ) when crossed with *M. quasifalcata* ( $2n = 16$ ), both diploid wild species free from degeneration, gave  $F_1$  and  $F_2$  generations in which partial sterility was observed, together with degeneration phenomena thought to be caused by genetic disharmony between the species.

A list is presented showing those parental combinations which give rise to fertile hybrids with good fodder-producing capacity, combined

with freedom from degeneration and resistance to fungous diseases such as *Pseudopeziza medicaginis* and rust. They include several complex hybrids involving *M. falcata* and others involving *M. glutinosa*. In all crosses it was noticed that  $F_2$  generations obtained by pollinating with a pollen mixture were healthier than those obtained by inbreeding the  $F_1$  plants.

3127 LUBENEC, P. A.

**(Biological basis of improving the hereditary properties of local variety-populations of lucerne during seed production).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 3-18. [Russian].

The local populations of lucerne in the Ukraine, North Caucasus and adjacent zones arose mainly from natural hybridization between introduced forms of *Medicago sativa* with local wild forms of *M. falcata*. Others have arisen by natural selection from hybrids introduced deliberately, as in the case of Zaikevič's lucerne, which came from a hybrid of a local form of *M. falcata* with Grimm. They are consequently better adapted to the variable climatic conditions of the area and more productive than pure strains. An attempt has been made to improve them still further by selecting seed from some of the most promising populations; some selections of Slavjanskaja lucerne have outyielded the standard variety, Zaikevič, by 2-19% and imported strains by 8-10%. However, under the variable conditions of the area and over a prolonged period of time the best results were given by the unselected population, which proved more dependable than any of the selections from it. Seeds taken from plants that had been cut only once gave rise to plants that yielded 47-47.5 c. per ha. of hay, which was 8% more than those from seed taken from plants that had been cut twice; the latter group had clearly undergone less pollination between plants and was seen to contain a lower proportion of plants of hybrid type. When outpollination with less productive varieties was permitted the yield of hay from Slavjanskaja lucerne was reduced by amounts varying from 1.1 to 4.3%; outpollination with varieties of equal yielding capacity had no effect on the yields or increased them by up to 4.3%. All these results point to the necessity of employing methods of seed production which lead to the maximum conservation of the hybridity and associated vigour of these well-adapted populations.

3128 EVANS, A. M.

**The production and identification of polyploids in red clover, white clover and lucerne.**

New Phytol. 1955 : 54 : 149-62.

At the Welsh Plant Breeding Station, Aberystwyth, shoot immersion proved to be the most satisfactory method of colchicine treatment for lucerne, and the seedling-drop method for red and white clovers, using a concentration of 0.2%. Stomatal length and pollen-grain diameter provided a means of preliminary segregation of  $2n$  and  $4n$  shoots. In red clover, length of hairs on the monofoliate leaflets and on comparable leaflets of mature plants was significantly greater in  $4n$  forms than in  $2n$ . Root-tip counts of the chromosomes in the progeny is however necessary for conclusive identification of the tetraploids.

3129 AITKEN, Y.

**Flower initiation in pasture legumes. III. Flower initiation in *Medicago tribuloides* Desr. and other annual medics.**

Aust. J. agric. Res. 1955 : 6 : 258-64.

*M. tribuloides*, *M. litoralis*, *M. minima* and *M. hispida* all resembled early varieties of subterranean clover in their reaction to low temperature and photoperiod (cf. Abst. 3144).

3130 LARKIN, R. A. &amp; GRAUMANN, H. O.

**Anatomical structure of the alfalfa flower and an explanation of the tripping mechanism.**

Bot. Gaz. 1954 : 116 : 40-52.

In investigations at the Nebraska Agricultural Experiment Station two major forces were found to be involved in tripping: (1) the cohesive force between the two keel petals and (2) the pressure exerted by cells under tension in the basal region of the fused filaments. The former force, resulting from the interlocking of projections on the appressed surfaces of the keel petals, is sufficient to prevent spontaneous tripping. Clonal differences were found with respect to both forces. The restraining force of the keel appears to be more closely related to the proportion of insect-tripped flowers than the force with which the sexual column is released.

3131 SMIRNOVA-IKONNIKOVA, M. J.

**(Chemical composition of lucerne under the conditions of the Leningrad region).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 177-82. [Russian].

Analyses of a number of samples showed that

*Medicago falcata* had a higher protein content than *M. sativa*; some forms of the former from Siberia had up to 15-12% and some selections had even higher values, one of the best being a selection from the north of the USSR with 18.44%; some of the wild forms from the Novgorod and Pskov regions had 18.89% protein per dry weight.

3132 DAVIES, W. E.

**The yields of some French and other strains of lucerne.**

J. Brit. Grassl. Soc. 1954 : 9 : 285-99.

Data are given on the yields, earliness, tillering, recovery after cutting, autumn growth and resistance to prevalent diseases of 12 strains of French origin and six from other sources tested at Aberystwyth over the period 1950-53. The highest yields were given by strains of the Flamande, Poitou and Grimm types from climatic regions similar to Aberystwyth, while those from areas of markedly different climate did less well. The Grimm strains were least attacked by leaf spot, black stem and downy mildew.

3133 BRINK, R. A., JONES, F. R., SMITH, D. &amp; GRABER, L. F.

**Vernal alfalfa.**

Spec. Circ. Univ. Wisc. 1955 : No. 37 : unpaginated.

A description is given of Vernal lucerne (cf. PBA, Vol. XXIII, Abst. 2008). It is a synthetic variety of parentage involving six Cossack plants and five  $F_2$  plants from *Medicago media* x *M. falcata* hybrids; all the component lines were resistant to bacterial wilt. It has shown tolerance of yellow leaf blotch (*Pseudo-peiziza jonesii*) in Utah.

3134 PEAKE, R. W. &amp; CORMACK, M. W.

**Effect of bacterial wilt on hay yield of irrigated alfalfa.**

Canad. J. agric. Sci. 1955 : 35 : 202-10.

On the basis of yield trials conducted over a period of six years in irrigated areas in southern Alberta under conditions favourable to infection by bacterial wilt, Hardistan, Orestan, Ranger and Wisconsin Synthetic C were classed as highly resistant, Cossack, Ladak and Viking as moderately resistant and the remaining five varieties as highly susceptible. Ranger lacked winter hardiness.

3135 EVANS, A. M. &amp; DENWARD, T.

**Grafting and hybridization experiments in the genus *Trifolium*.**

Nature, Lond. 1955 : 175 : 687-88.

Using *T. pratense*, *T. medium*, *T. repens*, *T. hybridum*, *T. incarnatum*, *T. alexandrinum* and



*T. subterraneum*, grafts were studied at the Swedish Seed Association, Svalöf, Sweden, and later at the Welsh Plant Breeding Station, Aberystwyth. Seedling grafts in which the scion was inserted into the split crown of the stock gave highly satisfactory results, a 90% success often being achieved with interspecific combinations. Grafting had the effect of increasing self fertility but did not influence pollen production. Up to the present no mature interspecific hybrids have been secured from stock x scion matings, although evidence of fertilization has been obtained in the case of some crosses. As judged by the number of incipient embryos, the degree of success of stock x scion matings was similar to that obtained by crossing ungrafted plants. Since the success of grafting corresponded with that of hybridization it is suggested that the grafting technique could serve as a means of screening the numerous *Trifolium* species for interspecific compatibility.

- 3136 PANDE, K. K.  
**Pollen tube behaviour in *Trifolium* species.**  
Sci. & Cult. 1955 : 20 : 504-05.

It has been found that in *T. pratense* most of the pollen tubes, whether from compatible or incompatible pollen, became looped and twisted in the thick upper part of the style, only a few tubes from compatible pollen being able to reach the ovules unhindered. This retardation, which is distinct from the subsequent inhibition of tube growth in incompatible pollen, is also found, but to a lesser extent, in *T. repens*.

- 3137 BOVIEN, P.  
**Host specificity and resistance in plant nematodes.**  
Ann. appl. Biol. 1955 : 42 : 382-90.

After a discussion on host specificity and taxonomy in nematodes, reference is made to Scandinavian work on the resistance of clover species and varieties to *Ditylenchus dipsaci* (cf. *PBA*, Vol. XXII, Abst. 2001 and Vol. XXIV, Abst. 1142). The need for further work on the biochemistry and genetics of resistance is stressed.

- 3138 DE ROO, R.  
Het verwekken van tetraploidie in enkele voedergewassen door middel van colchicine II. (**The induction of tetraploidy in some forage plants by means of colchicine. II.**)  
Meded. LandbHooges. Gent. 1955 : 20 : 181-91.

The results of experiments carried out at the National Plant Breeding Station, Gent, Belgium,

to discover the most effective method of employing colchicine to induce polyploidy in seedlings of *Trifolium pratense* and *Beta vulgaris* are reported. Treatment under a bell jar in which the atmospheric pressure had been reduced increased the percentage of polyploids obtained. For *Trifolium pratense*, treatment with a 0.1% solution for 40 minutes at a temperature of 24° C. gave the best results. In the case of *Beta vulgaris*, the most satisfactory results were obtained by using either a 0.1% solution for 2 hours at a temperature of 27° C. or a 0.5% solution for 30 minutes at a temperature of 24° C.

- 3139 Foreløbig meddelelse om stammeforsøg med hvidkløver 1950-1954. (**Provisional report on varietal trials of white clover, 1950-54.**)  
Tidsskr. Frøavl 1955 : 22 : 155-57.

The combined results of six regional trials of 13 varieties conducted in Denmark are presented. The best varieties in order of yield were Pajbjerg Milka IIK, Dæno IIK, Lodi Øtofte IIK, and Pajbjerg Zero IIK; the first, third and last of these showed resistance to eelworm.

- 3140 BREWBAKER, J. L.  
**Incompatibility in autotetraploid white clover. II. Dominance and double reduction.**  
Genetics 1955 : 40 : 137-52.

Two self-incompatible autotetraploid clones induced by colchicine treatment and differing in a diallelic manner with respect to their *S* alleles were crossed, 39  $F_1$  and 139 back-cross plants being classified for their *S* genotypes. The two parents were found to have the genotypes  $S_5S_5S_6S_6$  and  $S_7S_7S_8S_8$  respectively. The 11 genotypic groups representing the 6 diallelic, 4 triallelic and 1 tetrallelic combinations possible were obtained, the plants within each group being self incompatible and cross incompatible. A nonlinear series of dominance relationships was established for the four *S* alleles by means of data from test crosses of the  $F_1$  and back-cross plants. Pollen grains which functioned because of a dominance interaction were less effective than uninhibited grains, weak or partial dominance in all combinations thus being indicated. The occurrence of crossing over between the locus *S* and the centromere was revealed by the functioning of homogenic *S* gametes resulting from double reduction. The minimum distance from *S* to the centromere was estimated as 22 units. Seed sets (*Y*) were correlated with the percentages of pollen (*X*) theoretically assumed

to be functional in compatible crosses. The calculated regression equation for this relationship was  $Y = 0.16X + 1.91$ .

3141 BRIGHAM, R. D. & WILSIE, C. P.

**Seed setting and vegetative vigor of Ladino clover (*Trifolium repens* Leyss) clones and their diallel crosses.**

Agron. J. 1955 : 47 : 125-27.

Field investigations were carried out at the Iowa Agricultural Experiment Station on five clones with high and five clones with low seed setting ability, space-planted nurseries of the parent clones, open-pollinated progenies and  $F_1$  single-cross progenies obtained by diallel hybridization being established in 1951. The clones were self incompatible. Seed setting of the parents was highly correlated with that of their open-pollinated progenies or single crosses. Single crosses and open-pollinated progenies were also highly correlated with respect to seed setting. Selection for high seed production should be effective since this characteristic was found to be widely heritable. A correlation of 0.83 was obtained between visual rating for seed setting and actual seed production. Ratings for seed setting, vigour, density and spread in the autumn of the first year provided a good indication of performance in the second year. Actual forage yields were closely related to scores for spread, vigour and density, suggesting that an over-all rating for vegetative vigour could be used as a basis for selection in spaced plants. The light coloured V marking on the leaves proved to be dominant to the green, unmarked condition.

3142 PORTZ, H. L.

**Variation in cyanophoric properties of white clover (*Trifolium repens* L.).**  
Diss. Abstr. 1955 : 15 : Publ. No. 10,532 : p. 8.

Differences in the cyanophoric properties of plants from various seed sources are described, reasons for this variation being suggested (cf. Abst. 1758).<sup>a</sup> The finding that two independent complementary genes condition cyanophoric characters is in agreement with the results of previous investigators. Testing to eliminate plants containing lotaustralin and linamarin should supplement the present seed-certification procedure.

3143 Stammeforsøg med alsike og kællingetand 1951-1954. (Strain trials of Alsike clover and birdsfoot trefoil, 1951-54).

Tidsskr. Frøavl 1955 : 22 : 171-73.

As a result of yield trials held at various stations

in Denmark, first class rank has been awarded to the diploid Alsike clover Øtofte II and the tetraploid line Øtofte 4n II and to the birdsfoot trefoil strains Tidlig Øtofte II [Early Øtofte II], Sildig Roskilde II [Late Roskilde II], Tidlig Pajbjerg II [Early Pajbjerg II] and Sildig Pajbjerg II [Late Pajbjerg II].

3144 AITKEN, Y.

**Flower initiation in pasture legumes. I. Factors affecting flower initiation in *Trifolium subterraneum* L. II. Geographical implication of cold temperature requirements of varieties of *Trifolium subterraneum* L.**

Aust. J. agric. Res. 1955 : 6 : 212-57.

In the six Australian varieties investigated, flower initiation was accelerated by exposing germinating seeds or seedlings to low temperatures, the cold requirement of early varieties being less than that of late. Long photoperiods decreased the cold requirement in both early and late varieties. The wide range in time of flower initiation within the  $F_2$  progenies of crosses between the midseason variety Mt. Barker and the early varieties Dwalganup, Pink Flower and Northern is considered to be the result of the action of several segregating genes. In the second paper, the geographical implications of the above results are discussed with reference to the cultivation of the varieties in different parts of Australia.

3145 SANDAL, P. C.

**Inheritance of a white flower color in crimson clover.**

Agron. J. 1955 : 47 : 147-48.

In investigations at the Arkansas Agricultural Experiment Station, the character of red flower *vs.* white has been found to depend upon a single pair of genes, designated *Cr cr*. True-breeding white-flowered types have been isolated which appear to be as vigorous as red-flowered forms. The development of a variety uniform for white flower colour is under way since purity could be easily maintained by roguing red-flowered plants. Flower colour should also prove useful as a marker character in breeding and genetical investigations.

3146 MURAKAMI, K. & SEKIJ, T.

**(On the aftermath and yield of nutrient in crimson clover).**

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 22 : Nos. 3 & 4 : 41-43. [Japanese].

Comparative investigations of the yield of green matter, dry matter and protein of a series of varieties introduced from the USA and cut 2-3



times per year are reported. Differences between the varieties were only slight, though Mississippi seemed to show a slight superiority with three cuts per year.

3147 YAMAMOTO, K.

**(Polyploid vetch induced by colchicine treatment).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 111-14. [Japanese].

A description of tetraploids of *Vicia sativa* produced by treatment with 0.025-0.050% colchicine solutions is given. Plant height and habit were similar to those of the diploids; flowering was later and number of seeds per pod considerably reduced. The modal metaphase configuration was 6<sub>IV</sub>.

3148 HUGUES, P.

Études préliminaires à la création d'un catalogue des espèces et variétés de vesces cultivées en France. (**Studies preliminary to the compilation of a catalogue of species and varieties of vetch cultivated in France**).

Ann. Inst. nat. Rech. agron., Paris 1954 : Sér. B : 4 : 385-448.

This survey of the principal varieties of *Vicia sativa* and *V. varia* grown in France was prompted by difficulties arising from the lack of homogeneity in imported seed. A catalogue of approved varieties suitable for cultivation in France is proposed, and to this end the Montpellier Plant Breeding Station has undertaken a comprehensive study of the morphological and physiological characteristics of varieties from the USA, the Near East, North Africa and different parts of Europe. Data on maturity group, length of vegetative and flowering period, growth habit, resistance to cold, 1000-seed weight, shape of seed, testa colour and morphology of leaves, flowers and pods are presented for 36 varieties of *V. sativa* and 2 cultivated varieties of *V. varia*. Information on the main morphological features of several related wild species are also included, in order that their presence may be readily detected by the grower.

3149 LUBENEC, P. A.

**(Transcaucasian sainfoin and new regions for its cultivation).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 71-89. [Russian].

Descriptions are given of the species *Onobrychis viciaefolia*, *O. arenaria* and *O. antasiatica* and of various forms of them which exist in parts of the Soviet Union. Some of the local forms of *O. antasiatica* found in Armenia, Georgia and

Azerbaijan are more productive and persistent than the European forms of *O. viciaefolia* and from them some new and improved strains have been selected; one of these, Transcaucasian Two-cut 9696, has outyielded European strains by 24-38% in hay yield. These yields are very little less than those from lucerne in wet years and considerably more in normal or in dry years; the protein content of the new selection is 7.06% higher than that of the European strains and 3.94% higher than that of lucerne, the cellulose content being less than in lucerne; very promising results have been obtained with strain 9696 in mixtures with ryegrass or other grasses. In addition to its greater persistency and more regular hay yields from year to year its seed yield is better than that of lucerne or European sainfoin, especially in areas of low rainfall. There are no hard seeds and all germinate within 5-6 days of sowing; the survival rate of the seedlings was better than in lucerne and their root development and nodule formation surpassed those of lucerne; this, together with the earlier spring growth, results in a more beneficial effect on the soil, as is witnessed by the greater yields produced by spring wheat sown after 8696 than those after lucerne. The Transcaucasian sainfoin also produced more nectar than the other two species.

3150 OFFUTT, M. S.

**Inoculation studies as related to breeding for resistance to bacterial wilt in *Lespedeza*.**

Diss. Abstr. 1955 : 15 : Publ. No. 10, 125 : p. 7.

The results of investigations on various aspects of bacterial-wilt infection at the University of Missouri have led to suggestions concerning procedures for (1) determining the resistance of strains in greenhouse tests in the winter and under field conditions in the summer, (2) selection of resistant individuals in large populations and (3) combining a study of the inheritance of wilt resistance and maturity with a breeding project to develop resistant strains. No details of these procedures are provided.

3151 WEBSTER, G. T.

**Interspecific hybridization of *Melilotus alba* x *M. officinalis* using embryo culture.**

Agron. J. 1955 : 47 : 138-42.

Two fertile interspecific hybrids were obtained between *M. officinalis* "Madrid" and *M. alba*. The character of low coumarin content in the latter parent had been derived from *M. dentata*. The F<sub>1</sub> plants possessed light green foliage and

cream-coloured flowers. The  $F_2$  progenies segregated for seed and seedling colour and for flower colour. Segregates with low coumarin content were obtained from only one of the hybrids; they were successfully back-crossed to both parental species, most of the resulting plants being vigorous and highly self fertile. The low frequency of meiotic irregularity was insufficient to account for the approximately 25% aborted pollen produced by the  $F_1$  hybrids; selection against certain gametic combinations apparently occurred.

- 3152 PORTZ, H. L. & JACKOBS, J. A.  
**Differences between seed lots of Ladino clover in cyanophoric properties.**

Agron. J. 1955 : 47 : 143-45.

A detailed account is given of the investigations referred to in Abst. 1758.

- 3153 MALIK, H. C.  
**Studies on Indian clover (senji) in the Punjab.**

Indian J. agric. Sci. 1955 : 25 : 67-71.

In tests conducted at 18 localities in the Punjab, over a period of five years, Senji 1, a new variety of *Melilotus parviflora* selected from local material at the Fodder Research Station, Sirsa, Punjab, gave higher forage yields than local varieties but matured 9-10 days later.

- 3154 LAMBERTS, H.  
Verbreiding van de grondslagen voor de veredeling van gele voederlupine.  
**(Broadening the basis of the breeding of yellow fodder lupins).**  
Wageningen 1955 : Pp. 56.

The genetical basis of low alkaloid content (cf. *PBA*, Vol. VIII, Abst. 1220 and Vol. XIV, Abst. 893) and of resistance to *Erysiphe polygoni* (cf. *PBA*, Vol. XXIII, Abst. 2021) and *Fusarium oxysporum* (cf. *PBA*, Vol. XIV, Abst. 894) is discussed. Mosaic resistant lines have been obtained at Wageningen from crosses with Dutch land races. In addition, new productive strains possessing early vigorous growth have been selected from crosses between a wild lupin discovered in Palestine (cf. *PBA*, Vol. XXIII, Abst. 2019) and the cultivated sweet lupin; further selection to improve the yield of these selections is being undertaken. Other important objectives in breeding are the development of high-yielding varieties with indehiscent pods (cf. *PBA*, Vol. XVIII, Abst. 1002), soft testas (cf. *PBA*, Vol. VIII, Abst. 1219) and glabrous pods (cf. *PBA*, Vol. XXIII, Abst. 1276). It is suggested that valuable breeding material exists

among the wild lupins of the Mediterranean basin and intensified research into this is urged.

- 3155 OLSZEWSKA, M. J.  
Observacje nad euchromocentrami i jąderkiem u *Lupinus albus* L. i *Lupinus luteus* L. **(Observations on euchromocentres and the nucleolus in *L. albus* L. and *L. luteus* L.).**

Acta Soc. Bot. Polon 1954 : 23 : 699-725.

Observations *in vivo* on the resting nuclei of the epidermis of the hypocotyl of *L. albus* and *L. luteus* showed that there was no reticulum; the only components of the nucleus were the euchromocentres and nucleolus.

Studies of fixed material from various tissues indicated the existence of two, usually club-shaped, bodies on either side of the nucleolus; at prophase, these bodies are transformed into chromosomes; they are designated "nucleolar euchromocentres."

The most frequently occurring number of euchromocentres was  $28 + 2$  nucleolar euchromocentres in *L. albus*, and about  $50 + 2$  nucleolar euchromocentres in *L. luteus*. The somatic chromosome numbers were found to be  $2n = 30$  and  $2n = 52$  for *L. albus* and *L. luteus*, respectively. Though the number of euchromocentres usually equals the number of chromosomes in a species, it was observed that, in *L. albus*, the number of euchromocentres varies with the tissue. The number of euchromocentres in the nuclei of meristematic tissue either equals, or is lower than, the number of chromosomes. The number and size of the euchromocentres increase with the degree of differentiation of the tissue.

- 3156 BOEKHOLT, K.  
Über die Bedeutung des Auftretens von bitteren Pflanzen in Beständen alkaloidfreier Lupinen. **(On the importance of the occurrence of bitter plants in stands of alkaloid-free lupins).**  
Saatgutwirtschaft 1955 : 7 : 170-71.

Data are presented showing that, as the result of their higher seed production and greater resistance to diseases and insect pests, bitter lupins occurring in populations of sweet *Lupinus albus* not subjected to annual roguing will constitute 11% of the total population within a five-year period and 34% within a ten-year period.

- 3157 LARSEN, K.  
**Cytotaxonomical studies in *Lotus*. I. *Lotus corniculatus* L. sens. lat.**  
Bot. Tidsskr. 1954 : 51 : 205-11.

The distribution, variability and taxonomy of



the tetraploid form *L. corniculatus* sens. str. and of the diploids *L. corniculatus* var. *alpinus*, *L. tenuis* and *L. uliginosus* are discussed. It is suggested that *L. corniculatus* sens. str. may have arisen as an autotetraploid of *L. corniculatus* var. *alpinus*.

- 3158 RACHIE, K. O. & SCHMID, A. R.  
**Winter hardiness of birdsfoot trefoil strains and varieties.**

Agron. J. 1955 : 47 : 155-57.

Varieties of birdsfoot trefoil were tested under field conditions at two centres in Minnesota and were also subjected to freezing tests. In the latter the seedlings were allowed to grow 14, 19, 24, 36 and 44 days in the greenhouse before being placed in a hardening chamber for 14 days at 3° C.; after hardening the plants were transferred to the freezing chamber for 12 hours at -12° C. In both field and greenhouse tests the birdsfoot trefoil Empire showed more hardiness than the other trefoils, with the possible exception of Viking, which was tested only by artificial freezing. No variety survived freezing after 14 days' growth in the greenhouse.

- 3159 BHATTACHARJEE, S. K.  
**Cytogenetics of *Lathyrus sativus* Linn.**  
Caryologia 1954 : 6 : 333-37.

According to observations on mitosis the 14 chromosomes constituting the diploid complement could be classified into five groups on the basis of size and the positions of the primary and secondary constrictions. Two chromosomes with secondary constrictions and one with a satellite were present. This observation accords with the three nucleoli seen at telophase I and in the tetrad nucleus. Meiosis was normal, suggesting that *L. sativus* is a diploid. The presence of three nucleoli in a diploid species is attributed to nonhomologous interchanges involving nucleolar and nonnucleolar chromosomes, homozygosity for such interchanges having been brought about through human selection.

- 3160 VAN DEN EYNDEN, G. P. A.  
**Some problems in the breeding of spurry (*Spergula arvensis*).**

Euphytica, Wageningen 1955 : 4 : 1-6.

At the Ottersum Plant Breeding Station, Netherlands, work on spurrey has been concerned chiefly with *S. arvensis* var. *sativa*, the higher yielding of the two cultivated forms. The crop is largely self-pollinated and by line selection from local races a number of promising strains have been obtained which vary in flowering time, vigour, disease resistance and yield. Civula, released in 1951, is higher-yielding

than local material, flowers later and combines leafiness and a fine stem with good standing capacity.

## ROOTS AND TUBERS

- 3161 BANDLOW, G.  
Die Genetik der *Beta vulgaris*-Rüben.  
(The genetics of *B. vulgaris* beets).  
Züchter 1955 : 25 : 104-22.

The literature on the subject is reviewed.

- 3162 ZIMMERMANN, K. F.  
Methodisches zur Züchtung von Futterrüben. (Notes on a method of breeding mangels).  
Züchter 1955 : 25 : 169-76.

Strains with high root yields and improved dry matter content were obtained at the Institute for Agriculture and Horticulture, Müncheberg Mark, Eastern Germany, by crossing mangels with sugar beets and selecting, from the F<sub>1</sub>, pairs of élite plants phenotypically of the desired type. The progenies of these pairs were then, if adjudged satisfactory, crossed with other pairs and further selection carried out for 4-5 generations. By this method, uniform types were obtained without danger of injury from inbreeding. Simultaneously with selection for high root weight and dry matter content, the quality of the flesh and ease with which the roots could be lifted were also improved. Although it was not found possible to obtain mangels with as high a dry matter content as that of the sugar beet it is claimed that the negative correlation between size of root and dry matter content has been broken by use of the method described.

- 3163 Stoppelknollen, 1955. (Turnips, 1955).  
Landbouwwoorlichting 12 : Bijl. 8; Ber.  
Rassenkeuze No. 187 : 1955 : unpaginated.

The principal varieties cultivated in the Netherlands are described briefly and tabulated data are provided on the content and yield of dry matter of each variety, the shape of the root and colour of the flesh, degree of resistance to club root and night frosts, ease with which the roots may be harvested and extent to which the leaves remain green.

- 3164 OLSSON, G., JOSEFSSON, A., HAGBERG, A. & ELLERSTRÖM, S.  
**Synthesis of the ssp. *rapifera* of *Brassica napus*.**

Hereditas, Lund 1955 : 41 : 241-49.

The majority of the progeny from large-scale crosses made in 1952 and 1953 at Svalöf,

Sweden, between tetraploid turnip and kale varieties resembled the maternal parents, but a few appeared to be amphidiploids with  $2n = 38$ . Most of the latter, designated the generation  $A_1$ , had good pollen fertility, were fully self fertile and resembled natural swedes in morphology. Their hybrids with the swede varieties Bangholm and Victoria were fertile and showed promise in respect of root weight and other characters. The  $A_2$  families were very variable and also contained promising material.

3165 JOSEFSSON, A.

**Tetraploid turnips a progress in Swedish root crop breeding.**

Hereditas, Lund 1955 : 41 : 285-87.

In trials carried out over a period of seven years at seven stations in Sweden, tetraploid strains were compared with the corresponding diploids, and the tetraploid variety Sirius, resulting from crosses between several strains, was compared with its highest yielding diploid constituents. The tetraploids all gave higher total yields of roots and dry matter but had a lower percentage of dry matter and gave lower yields of tops than the diploids; Sirius was the highest yielding tetraploid variety. The tetraploids tended to be slightly more resistant than the diploids to club root but more susceptible to *Pseudomonas erwiniae*.

3166 MATSUMURA, T.

**(On the morphology of the siliqua in the group of *Brassica* species with  $n = 10$  chromosomes grown in Japan).**

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 179-82. [Japanese].

A taxonomic and biometrical survey of siliqua morphology in *B. campestris*, *B. chinensis*, *B. japonica*, *B. juncea*, *B. narinosa*, *B. parachinensis*, *B. pekinensis*, *B. rapa* and some material from Nepal with 3-4 carpels is presented.

3167 HERMANSEN, J. E.

**Brassica crosses. I. Crosses between swede and rape.**

Årsskr. K. Vet.- o. LandbHøjsk., Kbh. 1955 : 33-52.

At the Royal Veterinary and Agricultural College, Copenhagen, it was found that, in crosses of three strains of swede with one of winter rape and one of summer rape, cross fertility was generally greater with rape as the male parent. Reciprocal differences were also observed in earliness, pigmentation of the neck and the propensity to form nodules on the roots, the hybrids tending to resemble the male parent

in respect of these characters. The  $F_1$  hybrids were all white-fleshed, irrespective of the colour of the swede parent, and were morphologically uniform and distinguishable from both parents fairly early during development, while the  $F_2$  generation showed a wider range of variation and greater resemblance to the parent forms.

3168 SOKOLOVA, O. J.

**(Increasing the yielding ability of swedes by intervarietal crossing).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 40-47. [Russian].

Many of the hybrids, particularly those in which the Vyšegorod swede participated, were notably more vigorous than the parent varieties in the early growth phases and their final yields of roots were generally higher; the best combinations were between the Vyšegorod swede and the Krasnoselsk and Swedish varieties; in 1947 these hybrids had average root weights varying from 740 to 977 g., the best of them showing an excess of up to 57% over the higher-yielding parent. In 1948 average root weights of up to 4 kg. were recorded for the best hybrids, the excess over the parent forms being from 7 to 33%. The hybrids had larger leaves, they protruded somewhat less from the ground and although their dry matter content was somewhat lower than that of the parents, their yield of dry matter was also greater, by amounts varying from 8 to 62%; some of them also excelled the parents in resistance to dry rot, *Plasmodiophora brassicae* and other diseases.

White flesh colour proved dominant, whereas in other root characters the hybrids were mainly intermediate between the parents. All had good keeping quality.

3169 OLSSON, G. & HAGBERG, A.

**Investigations on haploid rape.**

Hereditas, Lund 1955 : 41 : 227-37.

At Svalöf, Sweden, seven haploids of *Brassica napus* were found with 19 somatic chromosomes each. They were morphologically similar to but smaller than the normal diploid plants ( $2n = 38$ ) among which they were found. During metaphase I in most pollen mother cells, 5-8 bivalents were apparent, some of which were heteromorphic, and chromosome bridges, fragments and laggards were observed during anaphases I and II. The plants are regarded as amphihaploids bearing one genome of *B. campestris* and one of *B. oleracea*, and the similarity of their meiotic behaviour to that of the  $F_1$  hybrid of *B. campestris* x *B. oleracea* is noted (cf. PBA, Vol. VI, Abst. 192). The fertility



of the pollen and ovules was about 0.1%, the progeny obtained by fertilization with normal pollen consisting of fertile diploids and a few plants with about 57 chromosomes. The possibility of obtaining homozygous diploid rape from the haploids is discussed.

3170 SAKSA, P. J.

Maamme perunalajikkeiden viljelylaajuus ja viljelyaluet. (**The extent and regions of cultivation of potato varieties on our land**).

Maataloust. Aikakausk. 1955 : 27 : 41-52.

The results of a survey made in 1950 of land in Finland under potato cultivation are given. Ruusulehti [*Rosafolia*], the most frequently cultivated variety, only accounted for one eighth of the total area, while one third of the area was planted with miscellaneous, undetermined or local varieties. The importance of guidance on use of varieties is stressed, especially for small farms where the poorer yielding varieties are most commonly grown.

3171 **New varieties in practice.**

Windmill, The Hague 1955 : No. 16 : p. 16. (Also French 14-15, German 16-17, Spanish 18-19 and Italian 19-20).

The commercial status of new potato varieties placed on the Netherlands descriptive list of agricultural crop plants (cf. p. 104) since 1950 is reviewed. Noordstar (cf. *PBA*, Vol. XXIV, Abst. 432) and Thorma have been removed from the list, the former because it was difficult to rogue for mosaic, the latter because of its susceptibility to *Phytophthora infestans*. Gineke, Urgenta, Ari, Sirtema and Sientje (cf. *PBA*, Vol. XXIV, Abst. 432) have been well received by growers and the area devoted to their cultivation is on the increase. Brief additional information on the following varieties is also given: Prudal, Barima, Prinslander, Irene, Pimpernel and Froma (cf. *PBA*, Vol. XXIV, Abst. 432).

3172 STURLA FRÍÐRIKSSON

Samanburður á kartöfluafrigðum 1948-1953. (**Comparison of potato varieties, 1948-53**).

Rit Landbúnadardeildar 1954 : A-Flokkur; No. 9 : Pp. 23.

Comparative trials of 142 varieties from Iceland, Sweden, the USA and Tierra del Fuego are reported. The characters studied were yield, using Kerr's Pink as the standard, percentage of small tubers, dry matter content, starch content, frost resistance and storage capacity. Sequoia

yielded best, followed by Kennebec. The most frost-resistant varieties were Kerr's Pink, Sequoia, Raudar íslenzkar [Red Icelandic] and Furore.

3173 Aardappels, 1955. (Interprovinciale proefvelden). [**Potatoes, 1955. (Inter-provincial experimental fields)**].

Landbouwvoorlichting 12.5 : Bijl. 7, Ber. Rassenkeuze 1955 : No. 186 : Pp. 6.

Data on maturity, starch and dry matter content, yield per ha. and quality of the tubers are presented for the main varieties cultivated in the Netherlands for home consumption and export (cf. Abst. 2128).

3174 DENDRINOS, A.

(**Results of variety trials of potatoes for autumn planting following treatment with ethylene chlorhydrin to force sprouting**).

Georgikon Deltion (Agric. Bull.)/Bull. Agric., Athens 1954 : 3 : No. 8 : 95-98. [Greek].

Comparative yield trials involving 18 autumn-planted varieties, mainly introductions from the Netherlands, were made in 1950 and 1953. The best results were obtained from Arran Banner.

3175 (**New varieties raised by the Ministry of Agriculture and Forestry in 1954. I. Potatoes**).

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : p. 91. [Japanese].

Brief descriptions are given of the following new varieties: Oojiro (Danshaku [Baron] x Norin 1 [Ministry of Agriculture and Forestry I]), an early potato of attractive appearance and flavour; Kennebec; and Hoira, a variety adapted to warm regions in south-western Japan.

3176 DEML, H.

Kartoffelzüchtung und Zuchtstätten in Bayern. (**Potato breeding and breeding centres in Bavaria**).

Kartoffelbau 1955 : 6 : 88-90.

A popular account of potato breeding in Bavaria since the beginning of the century is presented, together with brief information on the principal breeding stations.

3177 BUDIN, K. Z.

(**Južanin, a new potato variety**).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 37-38. [Russian].

Južanin [Southerner] was bred at Orel from Early Rose x a seedling of Switez. It has a short growth period and produces tubers notable for good keeping properties and flavour. Under

the drought conditions of southern Russia its tuber yield exceeds that of Lorh and Courier.

3178 ESTRADA RAMOS, N.

Los híbridos interespecíficos e inter-varietales de papa; una forma práctica para mejorar las variedades cultivadas en las zonas andinas. (**Interspecific and intervarietal potato hybrids; a practical way of improving the varieties cultivated in the Andean zones**). Agricultura trop. 1955 : 11 : 87—94.

Certain results of selfing and hybridization reported in the literature are passed in review. In the author's own crosses in Colombia some gave hybrids in which the specific weight of the tubers was greater than that of the parents, in others it was intermediate. Time of maturity was usually intermediate, as was photoperiodic reaction, with a slight tendency for the hybrids to approach the short-day parent more than the long. Several domestic varieties that give good results in Colombia have been used as seed parents and pollinated with Colombian varieties of *Solanum tuberosum* subsp. *andigenum* and tabular details are given for characters such as yield, resistance to *Phytophthora infestans*, earliness and tuber quality. One hybrid of Madison x Pana Blanca [White Plush] is classed as highly resistant and yielded 3.40 kg. per plant of tubers described as good in quality.

3179 OCHOA, C.

**Species of *Solanum* (*Tuberarium*) of South America. Present taxonomic status and species used in plant breeding with special reference to Peru.**

Phytopathology 1955 : 45 : 247—50.

A survey of the potentialities of some wild and cultivated species of South America as sources of resistance to various disorders is followed by an account of breeding in Peru. Some of the highest-yielding selections have been derived from *S. curtilobum* x *S. andigenum* and from intervarietal and intravarietal crosses of *S. andigenum* vars. *juninum*, *platyantherum*, *ancashicum*, *tumbo* and others. Several frost-resistant Peruvian species have been used in crosses with cultivated varieties. Selections have been obtained from *S. andigenum* x *S. acaule* and *S. acaule* x *S. stenotomum*, with resistance to  $-3^{\circ}\text{C}.$ ; but back-crossing to the cultivated parent to eliminate undesirable tuber characters has resulted in a considerable decrease in frost resistance. Lines from *S. goniocalyx* x *S. tuberosum* have shown good tuber formation,

flavour and yield and are resistant to  $-1^{\circ}$  and  $-2^{\circ}\text{C}.$  Selections from *S. stenotomum* var. *mauna* x *S. andigenum* have shown similar desirable characters but have a prolonged period of vegetative growth. The frost-resistant triploid species *S. juzepczukii* is largely sterile, and attempts to cross it with polyploid cultivated species have proved unsuccessful.

In addition to races A, C and D of *Phytophthora infestans* occurring in Peru, two new races, I and J, have been found. The  $F_1$  generations of crosses between *S. antipoviczii* and intraspecific hybrids of *S. andigenum* have shown immunity to races A, C and D. All the cultivated species tested were susceptible and attempts to cross them with the immune species *S. bulbocastanum* and *S. pinnatisectum* were unsuccessful.

3180 MARKS, G. E.

**Cytogenetic studies in tuberous *Solanum* species. I. Genomic differentiation in the group *Demissa*.**

J. Genet. 1955 : 53 : 262—69.

In investigations at the Potato Genetics Station, Cambridge, England, meiosis was studied in (1) a polyhaploid of *S. demissum* with 36 chromosomes; (2) the hexaploid species *S. brachycarpum*, *S. demissum*, *S. guerreroense* and *S. spectabile*; and (3) the hybrids *S. spectabile* x *S. demissum*, *S. brachycarpum* x *S. spectabile*, *S. guerreroense* x *S. spectabile*, *S. guerreroense* x *S. demissum* and *S. brachycarpum* x *S. demissum*. In the polyhaploid 1–10 bivalents were formed; the formula  $ABB^1$  for the genome of polyhaploid *S. demissum* therefore appears justified. All the hexaploid species ( $2n = 72$ ) displayed almost complete bivalent pairing. In the hybrids high frequencies of univalents occurred; more multivalents were formed than in the parents and the frequency of bivalents ranged from 20.30 in *S. spectabile* x *S. demissum* to 26.00 in *S. guerreroense* x *S. spectabile*. Pollen fertility was low as the result of unbalance in the number of chromosomes. The following genome formulae are suggested: *S. brachycarpum*, AABBBB; *S. demissum* 'CP1342.2,' AABBB<sup>1</sup>B<sup>1</sup>; *S. guerreroense*, AABBB<sup>2</sup>B<sup>2</sup>; *S. spectabile*, AABBB<sup>3</sup>B<sup>3</sup>; and *S. demissum* 'CPC2103.1,' AABBB<sup>4</sup>B<sup>4</sup>. The greatest differentiation among the B genomes appeared to exist between B and B<sup>2</sup> and between B<sup>3</sup> and B<sup>4</sup>. It is postulated that the hexaploids originated by chromosome doubling of hybrids between a common  $2n$  ancestor and various unrelated  $4n$  species, very little differentiation having subsequently occurred at the  $6n$  level. Possibly *S. verrucosum* is the ancestral diploid.



- 3181 LEBEDEVA, N. A.  
(**Miçurinist methods of overcoming incompatibility in potatoes**).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 103-14. [Russian].

Experiments were carried out with *Solanum schreiteri*, *S. punae* and *S. depexum*, which resist up to 8° C. of frost, and *S. gibberulosum*, *S. parodii* and *S. schickii*, all resistant to Colorado beetle. None of these species will normally cross with *S. tuberosum*. Grafts were made of all the species on to domestic varieties and *vice versa* and the results are described. The grafted plants showed various deviations from type and in many respects resembled sexual hybrids between the species concerned; root tips of *S. punae* grafted on to Ballydoon contained cells with chromosome numbers varying from 52 to 60 and some cells had two or more nuclei. The seeds from selfing grafted plants of *S. schreiteri* and *S. punae* were twice as large as those from selfing ungrafted controls. Pollinations between the wild and domestic components of a graft gave sets of seed varying from 30 to 80%, as compared with 0% from the same species pollinated from ungrafted plants. Good sets were also obtained when both parental species were grafted on to tomatoes.

Pollination with mixed pollen gave much lower sets. The addition of macerated stigmas of the paternal parent however increased the set of seed in most crosses. Quite good results were also obtained by crossing the wild species with *S. demissum* or *S. kesselbrenneri* and then crossing the hybrids with *S. tuberosum*.

The best time of day and other conditions favouring success in these crosses are indicated.

- 3182 KOOPMANS, A.  
**Changes in sex in the flowers of the hybrid *Solanum rybinii* x *S. chacoense*. III. Data about the reciprocal cross *Solanum chacoense* x *S. rybinii*.**

Genetica 1955 : 27 : 465-71.

Studies on the floral structure of the  $F_1$  and  $F_2$  of *S. chacoense* x *S. rybinii* and of the back crosses of the  $F_1$  to *S. rybinii* suggest that the floral abnormalities occurring in many of the hybrids result from incompatibility between the genes for floral structure of *S. rybinii* and the cytoplasm of *S. chacoense*. These and previous results (cf. Abst. 1182) indicate that the genes of both *S. chacoense* and *S. rybinii* are unable to function normally in foreign cytoplasm.

- 3183 WRIGHT, N. S. & ROBINSON, D. B.  
**Potato wildings in Canada.**

Amer. Potato J. 1955 : 32 : 86-92.

Wildings have so far been found in Canada in Irish Cobbler, Sebago, Green Mountain, Warba and White Rose. They resemble plants infected with witches' broom virus in producing many stems and small tubers, but may be distinguished by their conspicuous terminal leaflets and large-celled internodal parenchyma. Selection of small tubers for seed may result in an increase in the production of wildings in a stock.

- 3184 SAVINSKAJA, N. V.  
(**Differences between plants from secondary buds of a single tuber**).  
Agrobiologija (Agrobiology) 1955 : No. 1 : 124-26. [Russian].

Strains with modified leaf shape were obtained by removing the initial buds and thus inducing secondary buds from the inner tissue to develop. Two plants from secondary buds from a single tuber bore leaves differing from each other and from the parent plant.

- 3185 ORACZEWSKA, W.  
Poziomy witaminy C w odmianach ziemniaków i jarzynach województwa Białostockiego. (**The content of vitamin C in potato varieties and vegetables grown in the province of Białystok**).

Acta Soc. Bot. Polon. 1953 : 22 : 853-56.

The ascorbic and dehydroascorbic acid content of 11 potato varieties and a few representatives of horseradish, onions, pickling cabbage, lettuce, radishes and chives was estimated. Amongst the potato varieties, the highest ascorbic acid content was shown by Helios, Delfin [Dolphin] and Wysokoborskie with values of 16.66, 12.96 and 12.96 mg.% respectively.

- 3186 ROINE, P., WICHMANN, K. & VIHAVAINEN, L.  
Askorbiinihapon määristä ja säilyvyydestä eri perunalajikkeissa. (**The content and stability of ascorbic acid in different potato varieties**).

Suom. Maataloust. Seur. Julk. 1955 : No. 83 : 71-87.

Experiments conducted with a large number of potato varieties grown at two different field stations in Finland showed that marked varietal differences in ascorbic acid content existed, with the variety Siikli at the top of the list. Rheingold, Eigenheimer, Ostbote and Magnum Bonum also ranked high. The stability of ascorbic

acid during storage was also studied. It was found to decrease most rapidly during the first few months of storage, dropping eventually to little more than half the original content. This loss took place most rapidly in varieties having the highest original content, although varietal differences were still distinguishable at the end of the storage period.

- 3187 FISCHNICH, O. & LÜBBERT, G.  
Fruchtbildung bei Kartoffeln und Förderung der Keimschnelligkeit ihrer Samen. (**Fruit formation in potatoes and the promotion of rapid germination of their seeds**).

Beitr. Biol. Pfl. 1955 : 31 : 179-206.

In experiments at the Völkenrode Agricultural Experiment Station, Germany, varieties that normally shed their flowers prematurely were induced to set fruit by the application of certain hormone pastes, the most efficacious being trichlorophenoxyacetic acid. Temperature and degree of humidity also affected percentage seed set. By removing the micropylar end of the testa and slightly damaging the endosperm, the period of dormancy of the seed was broken, even seeds from unripe berries being induced to germinate by this method. Seeds damaged in this way had to be germinated on filter paper as, when planted in soil, they suffered from infection by fungi and bacteria.

- 3188 MADEC, P. & PERENNEC, P.  
Contribution à l'étude de la tubérisation chez la pomme de terre. (**Contribution to the study of tuber formation in the potato**).

Ann. Inst. nat. Rech. agron., Paris 1954 : Sér. B : 4 : 449-67.

Studies at the Potato Research Laboratory, Landerneau, France, on the physiology of tuber formation in a number of early, medium-early and medium-late potatoes showed that considerable varietal differences existed in time from planting to tuber differentiation and tuber formation. All varieties formed their total complement of tuber primordia at a comparatively early stage, Bintje, Arran Banner, Erstling, Sirtema and Saskia in less than 50 days from planting and Étoile de Léon [Léon Star], Viola and International Prime within 50-80 days. Time of initiation of tuber formation was not always correlated with the stage of development of the foliage, the early variety Viola forming its tubers at a later stage than the medium-late variety Arran Banner. Diagrams illustrating the relative growth curves of the tubers of different varieties are given.

- 3189 HAWKES, J. G.  
**The ecology of wild potato species and its bearing on the origin of potato cultivation.**

J. Agric. trop. Bot. appl. 1954 : 1 : 356-58.

It is suggested that there is a tendency among all wild potato species to colonize ground over which the natural vegetation has been disturbed and competition from other plants thereby reduced. According to this hypothesis, clearings made in South America by primitive man would have inevitably resulted in the appearance of wild potatoes as weeds. In times of famine, forms with edible tubers would be gathered and, at a later stage, cultivated.

- 3190 KOPAL, S.  
Lihovarská hodnota bramborů a metodika jejího stanovení. (**The value of a potato variety for the alcohol industry and the methods of determining it**).

Sborn. čsl. Acad. zeměd. 1955 : 28 : 69-80.

A method of quantitative analysis, based on the estimation of starch content and the amount of alcohol produced under laboratory conditions, is described and data relating to a number of varieties are presented. Some German, Dutch and Polish varieties and varieties of uncertain origin are listed among the material highly productive of starch and alcohol. Parnassia was the best among varieties cultivated in Czechoslovakia.

- 3191 GEORGIEVA, R. & RONKOV, B.  
(**Investigating the inheritance of the solanin type of glucoalkaloids in some interspecific hybrids of the potato**).

Izv. Inst. Rastenievădstvo (News Inst. Pl.-Industr.), Sofia 1954 : 225-40. [Bulgarian].

The  $F_1$  of *Solanum caldasii* x Deodara was characterized by a high percentage of solanin in the leaves and tubers. In the  $F_2$  the solanin content was variable and in some plants did not exceed the amount permissible for domestic varieties. A further reduction was obtained by crossing hybrids from the above cross with one or two domestic varieties or by grafting the scions of Bintje or K on to the hybrid stocks. Data showing the results obtained by both these methods are presented.

- 3192 WATADA, A. E. & KUNKEL, R.  
**The variation in reducing sugar content in different varieties of potatoes.**  
Amer. Potato J. 1955 : 32 : 132-40.

At the Colorado Agricultural Experiment



Station, considerable varietal differences in the amounts of reducing sugar accumulated during storage at various temperatures for different lengths of time were found among the 54 varieties analysed. There was a significant negative correlation between percentages of dry matter and reducing sugar, suggesting that breeding for high dry matter content will generally result in the production of varieties which tend also to have a low content of reducing sugar. The feasibility of breeding more specially for the latter character is discussed.

- 3193 OCHOA N., C.  
Nuevos *Solanum* (*Tuberarium*) de la serie *Megistacroloba*. [New species of *Solanum* (*Tuberarium*) of the series *Megistacroloba*].

Agronomia, Lima 1954 : 19 : 166-74.

Three new species from northern Peru are described under the names *S. jalcae*, *S. sogarandinum* and *S. rachialatum*.\*

- 3194 KAMERAZ, A. JA.  
(Agricultural qualities of the new polymorphic cultivated potato species *S. andigenum* Juz. et Buk.). Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 57-70. [Russian].

Some of the hybrids between domestic varieties and *S. andigenum* have proved superior to the best domestic varieties in yield together with such characters as cold resistance, flavour, starch content or protein content. The wart-resistant variety Inmanda (Jubel x *S. andigenum* f. *tocanum*) and the early-maturing seedlings 96 and 101 (Epicure x *S. andigenum* var. *longibaccatum*) are specially mentioned. Some hybrids of Merkur x *S. andigenum* f. *llutuc-runtun* have yielded up to 3400 g. of tubers per plant in the neighbourhood of Leningrad. Full descriptions are given of the species *S. tuberosum* and *S. andigenum* showing the features in which they differ and their expression in the different varieties and forms of *S. andigenum*. As regards disease, most forms of *S. andigenum* are less severely attacked by *Phytophthora infestans* and by frost than the domestic varieties. It is pointed out that Fram, the only variety found to be resistant to the new race of wart found in Thüringen, has *S. andigenum* in its pedigree. Some forms have displayed resistance to black leg (*Bacillus phytophthorus*) and other bacterial diseases.

- 3195 BARSÍ, S.  
Adatok burgonyakeverékek ültetéséhez. (Data on planting potato mixtures). Növénytermelés 1952 : 1 : 253-55.

Mixed plantings of (1) Margit, Lörh, Mittelfröhe and Edelgard, and (2) Ackersegen, Merkur and Aranyalma [Golden Apple] have yielded more than unmixed plantings of the same varieties at the Vörösmező Research Station, Hungary.

- 3196 WEISÆTH, G.  
Ville og dyrkede potetarter i Andesfjellene. (Wild and cultivated potato species in the Andes).

Norsk Landbr. 1955 : 21 : 252-56.

A popular account of the cultivation and uses of potatoes in the Andes is given and the possibility of using wild and cultivated Andean species as a genetic source of such qualities as frost and disease resistance is briefly discussed.

- 3197 WEISÆTH, G.  
Andesfjellenes kulturpoteter. (Cultivated potatoes of the Andes).

Norsk Landbr. 1955 : 21 : 274-76.

In the second article in this series (cf. Abst. 3196) the author outlines the chief differences between *Solanum andigenum* and *S. tuberosum*. Although some of the best varieties of the former species approach some Norwegian varieties of the latter in yield, most are appreciably lower. Crosses have been effected between the North Argentine *S. andigenum* variety Collareja, which is resistant to cold and to drought, and several *S. tuberosum* varieties. Other species which may prove useful to Norwegian breeders are *S. phureja*, with tubers containing a high percentage of protein, and the two frost-resistant species *S. stenotomum* and *S. curtilobum*; the last two species, like many *S. andigenum* varieties, have, however, the disadvantage of being short-day plants.

- 3198 BARSÍ, S.  
Adatok a téli burgonyatermesztéshez. (Data on winter potato-growing). Agrártudomány 1953 : 287-89.

The resistance of *Solanum acaule* to low temperatures was confirmed and data are given on the effect of wintry conditions on Mittelfröhe, Merkur saját [Hungarian Merkur] and Merkur szovjet [Soviet Merkur].

- 3199 DJOKIĆ, A. M.  
Prilog proučavanju degeneracije krompira (A study of degeneration in the potato). Arh. poljopr. Nauk. 1954 : 7 : 105-20.

At Zemun, external conditions appear to be

\* Cited as *raguialatum* in the text.

responsible for the development of tubers producing filiform shoots. Plants grown from these tubers are weak and produce a high percentage of small, defective tubers with a reduced content of dry matter and starch. Some varieties such as Erstling, Kardinal [Cardinal] and Merkur were less prone to this form of degeneration than others.

- 3200 MASTENBROEK, C. & DE BRUIN, T.  
Het voorkomen van physio 4 van *Phytophthora infestans* in Nederland. (The occurrence of race 4 of *Ph. infestans* in the Netherlands).  
Tijdschr. PlZiekt. 1955 : 61 : 88-92.

Analysis of isolates of *Ph. infestans* from different parts of the Netherlands has indicated that, since 1951, race 4 has superseded race 0, which has almost disappeared (cf. *PBA*, Vol. XXIV, Abst. 2168).

- 3201 GRAHAM, K. M. & RACICOT, H. N.  
Races biologiques du *Phytophthora infestans* dans l'est du Canada. (Biological races of *Ph. infestans* in eastern Canada).  
Rep. Quebec Soc. Prot. Pl. 1953 : No. 35 : 50-54.

Three races were distinguished at the Division of Botany and Phytopathology of the Ministry of Agriculture, Ottawa, on the basis of their ability to attack different potato and tomato varieties.

- 3202 ZADINA, J.  
Virulentní biotypy plísňě bramborové. (Virulent biotypes of potato blight).  
Sborn. čsl. Acad. zeměd. 1955 : 28 : 11-20.

Potato varieties showing resistance to common biotypes of *Phytophthora infestans* proved susceptible when infected with virulent strains recently isolated in Czechoslovakia. Krasnoufinskii was the only variety possessing resistance to some of these biotypes.

- 3203 KAISER, W.  
Zur Frage nach der Resistenz der Kartoffel gegenüber *Phytophthora infestans*. (On the question of the resistance of the potato to *Ph. infestans*).  
Beitr. Biol. Pfl. 1955 : 31 : 293-96.

The value of wild *Solanum* species in breeding for resistance to *Ph. infestans* is discussed and mention made of difficulties arising from the development of new physiological races of the disease. A brief account of the proposed international nomenclature for races of *Ph. infestans* and genes controlling resistance (cf.

*PBA*, Vol. XXIII, Abst. 2048 and Vol. XXIV, Abst. 2168) is included.

- 3204 **Resists blight, ring rot.**

What's New Crops Soils 1954 : 7 : p. 24.  
Merrimack, a high-yielding, disease-resistant white potato developed at the New Hampshire Agricultural Experiment Station, is almost immune from ring rot (*Corynebacterium sepedonicum*) and the common race of late blight.

- 3205 AKELEY, R. V. ET AL.

**Merrimack: a new variety of potato resistant to late blight and ring rot and adapted to New Hampshire.**

Amer. Potato J. 1955 : 32 : 93-99.  
The late variety Merrimack, developed from a cross between Aranac (Katahdin x President) and X96-56 (Earlaine x USDA seedling 3895-13) and released by the Horticultural Crops Research Branch of the US Department of Agriculture and the Agricultural Experiment Station of the University of New Hampshire, is highly resistant to the common race of late blight, to ring rot (*Corynebacterium sepedonicum*) and to net necrosis, moderately resistant to early blight and apparently field immune from virus A. It has given satisfactory yields in New Hampshire.

- 3206 HEIDRICK, L. E.  
**Late blight resistance—present status.**

Phytopathology 1955 : 45 : 250-51.  
Methods of hybridization which have been used in breeding blight-resistant potatoes are surveyed briefly, the genetic variability of the pathogen is discussed, and the need for investigations into the limitations of the methods described and for further work on environmental effects on the host-pathogen relationships is stressed.

- 3207 KAMERAZ, A. JA.  
**(Production of agronomically valuable blight-resistant forms of potato by hybridization between the wild species *Solanum demissum* and the cultivated species *S. tuberosum*).**  
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 19-44. [Russian].

Data presented show the behaviour of a number of hybrids during the period 1937-40. The yield of tubers in the F<sub>1</sub> was generally low but some of the first back-cross generations gave yields of up to 24 g. per plant, a further increase being observed in later tuber generations and in second and third back crosses. Hybrids of the



type *S. tuberosum* x ( $F_2$  *S. demissum* x *S. tuberosum*) gave lower yields than ordinary double back crosses.

Seedlings with high starch content occurred in the  $F_1$  and in some of the back crosses, the results varying according to the domestic variety used. All the  $F_1$  plants had long stolons and so had most of the back-cross seedlings, though the first tuber generation and second back-cross generations tended to have more plants with compact tuber clusters, and again certain combinations were better in this respect than others. Tuber shape was mostly irregular in the  $F_1$  plants, the best in this respect being those from Katahdin crosses; in the back crosses the number of well-shaped tubers with shallow eyes varied according to the domestic variety used but did not increase in third and later back crosses.

The number of plants resistant to *Phytophthora infestans* varied from 20 to 70% in the  $F_1$  in leaf tests and 3.5 to 29% in tuber tests; in the  $F_2$  only 6% showed partial resistance in the tubers and none complete resistance; in the first back cross an average of about 8% showed some tuber resistance and rather less in the second back cross but the number rose again in the third back cross and quite a number showed resistance in the field.

Lists are given showing the domestic varieties found to have the best effect on back-cross progenies in respect of yield of tubers; it was found necessary that at least one of the domestic components of any cross should be an early variety, in order to confer on the hybrids the capacity for tuber formation in long days. Other varieties are indicated as exerting a favourable effect on starch content; their effect was not always proportional to their own starch content.

The blight-resistant variety 8670 has shown a slight tendency to be attacked in certain areas and has been crossed with a number of other varieties; the greatest numbers of high-yielding resistant seedlings have been produced in the crosses with Priska and Regina.

From the above crosses several promising hybrids have been obtained; they have exceeded the standard Berlichingen in yield, have compact clusters of well-formed tubers and have displayed complete resistance to *Ph. infestans* in both leaf and tuber when grown in the neighbourhood of Leningrad.

### 3208 (New varieties for production).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 3-5. [Russian].

Mention is made of new high-yielding potato

standards for the RSFSR that show resistance to wart and *Phytophthora*.

3209 GERN, A. P.

(A new fodder variety of potato).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 4 : 38-39. [Russian].

Hybrid 49038 is distinguished by a high starch content and resistance to *Phytophthora* and wart. It is a back cross involving some domestic varieties and *Solanum demissum*.

3210 MASTENBROEK, C.

A note on resistance of *Solanum*-species to powdery mildew.

Euphytica, Wageningen 1955 : 4 : 15-16.

*S. simplicifolium*, *S. antipovicii*, *S. longipedicellatum*, *S. macolae*, *S. polyadenium*, *S. sucrose* and hybrids of *S. simplicifolium* with two *S. tuberosum* varieties and *S. macolae* remained unattacked when exposed to infection by *Oidium solani* while all the *S. demissum* selections tested proved susceptible.

3211 FOCKE, R.

*Rhizoctonia*-Resistenzprüfung an Sämlingen einiger Wild- und Kulturkartoffeln. (Testing *Rhizoctonia* resistance in the seedlings of some wild and cultivated potatoes).

Züchter 1955 : 25 : 138-40.

A new method of testing potato seedlings for resistance to *Rh. solani* is described. The seeds are germinated in Petri dishes and transferred to a mixture of finely-sieved soil when the roots are 2-4 mm. long. As soon as the first leaves appear above the soil the plants are infected with the fungus and kept in total darkness at a temperature of 20-22°C. Differences in degree of susceptibility may be observed within 4 days. By the use of this method it was shown at the Institute of Experimental Biology of Rostock University that *Solanum demissum* and *S. schenkii* possess a greater degree of resistance, and *S. longipedicellatum* and *S. antipovicii* a lesser degree of resistance, than Mittelfröhe [Medium Early]. Differences in susceptibility between cultivated varieties were insignificant.

3212 HOWARD, H. W.

Breeding potatoes for resistance to root eelworm (*Heterodera rostochiensis*).

Heredity 1955 : 9 : p. 150. (Abst.).

The eelworm resistance shown by a few lines of *Solanum tuberosum* ssp. *andigenum* from Peru and Bolivia has behaved as a dominant character in crosses with standard varieties of potato at the Cambridge Plant Breeding Institute, England. The *andigenum* lines are short-day

types; an attempt has therefore to be made to combine their eelworm resistance with the long-day adaptation of commercial potatoes. The *andigenum* lines produce a root diffusate which allows the larvae to emerge from the cysts; the larvae are able to invade the roots but mature females do not develop.

3213 CORBETT, M. K.

**Apparent hypersensitivity of potato hybrids to potato virus Y.**

Phytopathology 1955 : 45 : 148-55.

Mechanical inoculation of the mature leaves induced hypersensitive reactions in seedlings obtained from the inbred progenies of six varieties, while exposure to the pathogen under field conditions or mechanical inoculation of very young plants or of the young tissues of older plants usually resulted in systemic infection. The four strains of virus used differed slightly in their effects, the Fillmore clones C150 and C117 showing resistance to Ym and to Ym and Ys, respectively. The value of these observations in screening breeding material for resistance is indicated.

3214 KÖHLER, E.

Weitere Beiträge zur Kenntnis des Y-Virus der Kartoffel. (**Further contributions to our knowledge of virus Y of the potato**).

Phytopath. Z. 1955 : 23 : 328-34.

Differences in the susceptibility of a number of German potato varieties to virus Y are noted. In some varieties, simultaneous infection with both virus Y and leaf-roll facilitated the spread of virus Y from the leaves to the tubers. A new virulent strain of virus Y, discovered in Oldenburg in 1952 and thought to be identical with the South American strain found by Nobrega and Silberschmidt in 1944, is described. It appears to provoke more serious symptoms on tobacco plants than on potatoes.

3215 EIKELAND, H.

X-virusfri setjepotet jamført med vanleg virusfengd utsæd. Forsøk ved Forus 1951-54. (**Seed potato free from virus X compared with ordinary virus-infected seed. Trials at Forus, 1951-54**).

Bondevennen 1955 : 58 : 257-61.

In trials at Forus, Norway, the semiearly varieties King George V and Saga were inferior in yield to the late and semilate varieties Ås and Parnassia when virus-free seed was used but showed less inferiority when infected seed was used.

3216 BURKILL, I. H.

**Aji and batata as group-names within the species *Ipomoea batatas*.**

Ceiba : 4 : 227-40.

The history of the vernacular names *aji* and *batata* is reviewed. The term *aji* appears to have been a local name for starchy types in Hispaniola in the fifteenth century; *batata* was originally a designation of varieties with sugary tubers but was soon adopted for the species as a whole.

3217 McLEAN, F. T.

**Breeding new sweet potatoes.**

Trans. Peninsula hort. Soc. 1951 : 41 : No. 5 : 41-43.

This brief account of sweet-potato breeding at the Virginia Track Experiment Station includes a description of two new red-skinned varieties, Vates Golden and Virginian, both developed from Maryland Golden x Hawaiian B-219. Vates Golden is fairly similar to the Jersey type Maryland Golden in the shape, colour and flavour of the roots and in time of maturity but is higher yielding, partly as the result of its uniform production of medium-sized roots. Virginian, on the other hand, resembles Porto Rico. Its roots are smooth-skinned, reaching marketable size early, with an unusually sweet flavour when freshly dug. Unlike Porto Rico, Virginian is free from a tendency to produce off-colour sports, but has the disadvantage of trailing too freely, with the production of small roots away from the hill.

3218 HASITSCHKA, G.

Über die Histologie der Intumescenzen und die Cytologie zweier *Ipomoea*-Arten. (**On the histology of the intumescences and the cytology of two *Ipomoea* species**).

Öst. bot. Z. 1955 : 102 : 99-104.

The results of preliminary histological and cytological studies at the Institute of Botany, Vienna University, are reported. *I. batatas* ( $2n = 90$ ) possesses 81-88, *I. purpurea* ( $2n = 30$ ) 57-61 chromocentres. Attempts are being made to cultivate *I. batatas* in Austria on a commercial scale.

## FIBRES

3219 **Research notes. II. A new improved strain Punjab American cotton for Haryana tract.**

Indian Cott. Gr. Rev. 1955 : 9 : p. 45.

Selected from the American cotton 216F, H14 is superior to the parent variety in respect of



yield, earliness, ginning percentage, fibre quality and jassid resistance. It has been placed on the list of varieties recommended for the Punjab.

3220 TODOROV, S.

**(The development of cotton production in the People's Republic of Bulgaria).**

Hlopkovodstvo (Cott.-raising) 1955 : No. 5 : 51-60. [Russian].

A brief account of breeding work on cottons, notably at Ćirpan, is given. Mention is made of a new high-yielding variety 2362 developed from Bulgarian material. In recent trials it has outyielded all Bulgarian and Soviet varieties by a good margin and was distinguished by a high ginning percentage and a good length of fibre, longer than that of the Soviet variety 915.

3221 Activité de l'I.R.C.T. Année 1953. **(The work of the IRCT for the year 1953).** Cot. et Fibr. trop. 1954 : 9 : 139-279.

This report, issued by the Institute for Research on Cotton and Exotic Textiles, Paris, deals primarily with cotton breeding and cotton variety trials in French Africa. The results of fertilizer, insecticide and irrigation trials are also presented and brief mention is made of the cultivation of jute, hemp, flax, sisal, ramie, *Urena lobata* and *Hibiscus cannabinus*.

*French Equatorial Africa*

The variety Banda has given highly satisfactory results and is gradually replacing Triumph, to which it is superior in yield as well as in fibre properties. Selection has resulted in a marked improvement in the yield of Allen du Tchad.

At the Bambari station, the new selection Banda 4 has shown promise. The productive, wilt-resistant line GAR 32 1035-84-235 is to be bulked. In the breeding programme, emphasis is being placed on improved resistance to diseases and insect pests and foreign varieties are being tested for their adaptability to this part of Africa. Mass pedigree selection of Stoneville and Arkansas 17 has resulted in lines possessing increased resistance to wilt and jassids and improved technological properties. The blackarm resistance of BAR 10/2 N'Kourala and NT 205/43 has been incorporated in Banda. Of the hybrids obtained from these intervarietal crosses, some lines selected from Banda x BAR 10/2 possess excellent fibre qualities. The triple cross (*Gossypium arboreum* x *G. anomalum*) x *G. hirsutum* has been back-crossed to *G. hirsutum*; the majority of the back-cross progeny proved sterile. In variety trials, Arkansas 1606-4, Stoneville 1439, Banda 2 and Allen

Samaru 36C gave the highest yield. Varietal differences in reaction to jassids, *Hemitarsonemus latus*, *Xanthomonas malvacearum* and *Fusarium vasinfectum* are noted.

At the Bossangoa station, lines A25 and A123C have proved resistant to *Lygus* sp. The hybrid (Triumph x U4) x (Ishan x U4) has displayed good resistance to wilt. Data on the yields, fibre quality and technological properties of a number of varieties and pedigree lines are presented.

At the Tikem station, pedigree selection is being carried out on Deltapine, AM1, Samaru and Rogers Acala. The new selection Allen 50T gave the best results in variety trials. At the Bebedjia station, too, Allen 50T outyielded the parent variety and produced fibre of superior quality. It was also slightly more resistant to jassids and possessed good resistance to blackarm and *Lygus* sp. The selection 26-c-50 has given promising yields; it is highly resistant to jassids but susceptible to *Lygus* sp.

*French West Africa*

Mass and pedigree selection of N'Kourala, Sahel, Webber and Allen is in progress at the Bouaké station and promising lines have been obtained. At the M'Pesoba-Koutiala station, Allen 150 and A-49-T gave the highest yields.

*Madagascar*

Of varieties recently introduced into the south-west of the island, Ashmouni and Acala have given the most promising results.

*French North Africa*

At the Tadla station, Morocco, two selected lines of Pima 67, M150 and M151, are being bulked. M151 is superior to Pima 67 in yield, maturity and fibre quality. The technological properties of Ashmouni and Menoufi have been improved by selection. In variety trials, Sakha 4, Malaki, Ashmouni and M151 gave the best results. At Ferme Blanche, a number of promising intervarietal and interspecific hybrids have been obtained. Varietal differences in performance on saline soils are noted.

At the Bône Experiment Station, Algeria, the varieties Acala 4-42 and Acala California proved superior in yield, fibre quality and resistance to jassids.

3222 **Parrott, new cotton variety.**

Sth. Seedsman 1955 : 17 : No. 12 : p. 34. Parrott (CR-3), selected from Mebane 140 at the Oklahoma Agricultural Experiment Station, is suitable for harvesting by mechanical stripper. It is superior to other stripper varieties in yield, earliness, lint percentage and fibre qualities.

- 3223 25<sup>a</sup> memoria anual correspondiente a 1952. Cultivo : algodnero. (25th annual report, corresponding to the year 1952. Cotton).  
Estac. exp. agric. La Molina 1952 : Pp. 34. (Mimeographed).

Mass selection of Tangüis cotton with the object of improving uniformity and wilt resistance has continued. Lines from single plant selections have been studied for yield, lint quality and resistance to *Verticillium albo-atrum*, *Thielaviopsis basicola*, *Alternaria* sp. and *Acremonium* sp. Line LM1041-49 has again proved significantly better than others in yield at La Molina and line LM.W.467-45 in high lying areas badly affected by wilt.

From crosses of Tangüis with Karnac, Pima and U4, lines have been selected on the basis of photoperiodism. They have exceeded the Tangüis selections in earliness but not in lint yield.

- 3224 RHYNE, C. L.  
**The inheritance of yellow-green, a possible mutation in cotton.**  
Genetics 1955 : 40 : 235-45.

Seedlings of a yellow-green mutant found in Upland cotton are distinguishable from those of the virescent yellow (V) form by their yellow-green cotyledons. The yellow-green mutant is a recessive type differing from normal green varieties of *G. hirsutum* at one locus,  $Yg_2$ , or at this locus and another,  $Yg_1$ . The gene  $Yg_2$  was linked with  $R_2$  for red petal spot and  $K$  for brown lint belonging to subgenome A;  $R_2$  has been reported to be linked with  $Cl_2$  for noncluster habit. The factor  $Yg_2$  presumably belongs to subgenome D and possibly to linkage group  $R_1-cl_1-dw$ . Some evidence was obtained that an allele of  $Cl_2$ , with a function different from that of the normal  $Cl_2$  in *G. hirsutum*, may be present in the yellow-green stock. The phenotype of the triple recessive  $yg_1yg_2v$  was virescent yellow; limited data indicated linkage between  $v$  and one of the loci for the yellow-green character. *G. barbadense* possesses the alleles  $Yg_1$  and  $Yg_2$ . The possible stages in the evolution of the duplicate inheritance of the yellow-green character are discussed.

- 3225 BHAT, N. R. & DESAI, N. D.  
**Linkage of "pale green leaf" with "curled leaf" in *G. herbaceum*.**  
Curr. Sci. 1955 : 24 : 170-71.

It is stated that the factor for the pale green leaf in *Gossypium herbaceum*, referred to by Patel *et al.* (cf. PBA, Vol. XIX, Abst. 1098), belongs to the same linkage group as the genes

for leaf shape, lint colour, curled leaf and the lintless condition ( $li_a$ ).

- 3226 TER-AVANESJAN, D. & BEKSEEV, Š.  
**(A method of directing the dominance of characters in cotton hybrids).**  
Hlopkovodstvo (Cott.-raising) 1955 : No. 6 : 55-57. [Russian].

At Taškent, cotton hybrids that produce a large boll and a high yield of raw cotton before the advent of frost have been obtained from crosses between early strains and large-bolled varieties characterized by midseason or late maturity. To impart the characteristics of the large-bolled ♂ parent to the progeny the inheritance of the early ♀ parent was weakened by sowing on 18 March instead of the customary date, 15 April; the ♂ parent was sown on 15 April or later, since by sowing it at the early date its inheritance was also weakened. The mode of inheritance of characters in a number of  $F_1$  hybrids in relation to the date of sowing and the effects of sowing dates upon segregation of the  $F_2$  hybrid are described. Data on the length of fibre, boll weight, fibre yield and the percentage of raw cotton yield before the onset of frosts for the best  $F_2$  hybrids are presented.

- 3227 ROZEN, G.  
**(The leaders of cotton production in the People's Republic of Bulgaria).**  
Hlopkovodstvo (Cott.-raising) 1955 : No. 4 : 57-61. [Russian].

New Bulgarian varieties originating from Čirpan and Sadovo are briefly described. They exceed the existing strains in earliness and yield, produce larger bolls, and have longer lint and a higher ginning percentage. Some hybrids between the above new varieties and Egyptian cottons are referred to briefly. They are distinguished by good staple length and large bolls. The methods and aims in breeding are outlined.

- 3228 CHRISTIDIS [KHRISTIDIS], B. G.  
**Hybrid vigour effects with cotton.**  
J. Genet. 1955 : 53 : 224-31.

Compared with the parent with the higher value for the given character,  $F_1$  hybrids involving two local selections and  $F_4$  *Gossypium barbadense* x *G. hirsutum* exhibited heterosis with respect to yield, earliness and possibly boll weight but not ginning outturn or lint length in experiments carried out during 1948-53 at the Hellenic Cotton Research Institute, Sindos, Greece. The expression of heterosis for yield and earliness varied according to the season. In most cases the increases in yield were not considerable. The  $F_2$  generation was equal or inferior to the



F<sub>1</sub> in yield, the F<sub>3</sub> markedly inferior. The use of F<sub>1</sub> seed does not therefore seem to offer any commercial advantage.

3229 SIMPSON, D. M.

**"Radical methods" seek hybrid cotton vigor.**

Tenn. Fm. Home Sci. 1954 : No. 9 : p. 4.

Under conditions in Tennessee the amount of natural crossing ranges from 30 to 60%, insect pollinators being chiefly responsible. The possibility of exploiting hybrid vigour commercially is being investigated by means of experiments on three methods: (1) natural crossing between two selected parents of which at least one carries a seedling marker character so that by selective thinning a crop consisting entirely of F<sub>1</sub> plants can be secured; (2) use of advanced generation seed, the F<sub>1</sub> seed being produced by hand pollination; and (3) plants raised from a mechanical mixture of two or more varieties allowed to undergo natural pollination so as to produce seed containing a high percentage of hybrids.

3230 HUTCHINSON, J. B.

**Sources of gene material for cotton improvement.**

Emp. Cott. Gr. Rev. 1955 : 32 : 102-07.

The author considers that the best sources of genetic variability for the improvement of cotton are not the Central American forms of *Gossypium hirsutum* (cf. *PBA*, Vol. XXII, Abst. 358) but the modern cultivated biotypes of *G. hirsutum* race *latifolium*, the large populations of which are subjected to only moderate selection pressure and hence to relatively low elimination of mutants. The races *punctatum* and *marie-galante* may also be of use. Inter-specific transference of characters is attended by considerable difficulty, but species which should be of value in improving Upland cottons are *G. barbadense* and the diploid species, particularly the diploid Asiatic cottons, the wild African species bearing the B genome and the New World species with the D genome.

3231 BROWN, M. S.

**A comparison of pachytene and metaphase pairing in species hybrids of *Gossypium*.**

Genetics 1954 : 39 : 962-63. (Abst.).

It is concluded that pairing at pachytene in interspecific hybrids of *Gossypium* cannot be used as an indication of chromosomal or specific differentiation, since the chromosomes of different genomes pair closely at this stage independently of the degree of metaphase association, and since pachytene pairing in sterile or fertile interspecific hybrids appears to be as intimate

as within a given species. Metaphase pairing therefore remains the most satisfactory criterion of chromosome homology. Chiasma formation and not chromosome pairing appears to be the critical event for metaphase association in inter-specific hybrids. Paired pachytene chromosomes of different genome groups are equal in length in spite of different size at metaphase. It is suggested that, in *Gossypium*, chromosome size at metaphase may be controlled by an autonomous mechanism within individual chromosomes and that another analogous mechanism governs chiasma formation.

3232 MEYER, J. R.

**Genes from cotton species—*Gossypium hirsutum*.**

Genetics 1954 : 39 : p. 982. (Abst.).

The production of pentaploids by crossing *Gossypium hirsutum* with diploid species having the A or D genome, followed by chromosome doubling of the triploid hybrids and back-crossing the resulting hexaploids to *G. hirsutum*, provides a means of transferring genes from diploid species to Upland cotton. A double haploid of Upland is being used in the synthesis of such pentaploids. Fourteen different characters of the plant, leaf and flower determined by dominant or partially dominant genes are being transferred to this doubled haploid by back-crossing. The resulting isogenic strains can be used for interspecific genome analysis and other studies.

3233 MENZEL, M. Y. & BROWN, M. S.

**The tolerance of *Gossypium hirsutum* for deficiencies and duplications.**

Amer. Nat. 1954 : 88 : 407-18.

Ten lines with 12 different translocation complexes involving a minimum total of 29 breaks and rearrangements were derived from X-irradiated material. Deficiency duplications were recovered from ten and probably all twelve lines. It is therefore concluded that the recovery of viable deficiency-duplications from translocations is the rule rather than the exception in *G. hirsutum*. None of the heterozygotes or plants with deficiency-duplications were sterile, although some were less fertile than normal plants in the same progeny. Several of the translocation complexes differed in the size of the chromosomes and length of the interchanged arms in such a way as to permit identification of the heterozygote and some or all of the deficiency duplications by metaphase I configurations. In three lines, deficiency duplications for segments carrying marker genes were recovered.

3234 MENZEL, M. Y.

**A cytological method for genome analysis in *Gossypium*.**

Genetics 1955 : 40 : 214-23.

As indicated by  $F_1$  hybrids between a deficiency-duplication dwarf of the genotype  $2n + 2A - 2x$  and *Gossypium raimondii*, translocation 2B-1 in *G. hirsutum* consists of an interchange between a very short segment of "chromosome 1" in the subgenome  $D_h$  and a long segment from "chromosome 2" in the subgenome  $A_h$  (cf. *PBA*, Vol. XXIII, Abst. 1317). When paired with its *G. hirsutum* homologue, chromosome 1 of *G. raimondii* (genome  $D_5$ ) exhibited a reduced frequency of metaphase chiasmata in the right arm but not in the left. Chromosome 2 was found to be one of the four  $A_h$  chromosomes differing from those of the  $A_h$  genome of *G. herbaceum* in end arrangement. It was demonstrated that when one of the  $At-A_1$  ring complexes is introduced into *G. hirsutum* at least two types of deficiency-duplication gametes functioned in addition to the two types of balanced gametes.

3235 TER-AVANESJAN, D. V. & GUREVIČ, L. I.  
**(Some characteristics of the biology of fertilization in plants).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 88-96. [Russian].

Reference is made to the phenomenon of multiple fertilization and experiments are described in which plants of *Gossypium hirsutum* 'Bolgarka 78' were pollinated with mixed pollen from *G. hirsutum* '1677' and *G. barbadense* '35-1', both of which possess certain characters known to be dominant to those of Bolgarka 78. All plants produced proved to be hybrids of Bolgarka 78 with one or other of the two pollen parents. In a further experiment emasculated flowers of Bolgarka 78 were pollinated with 10 grains of the red-leaved form 1677 and later with unlimited quantities of pollen of 35-1 after varying intervals of time; in the progeny 126 plants were hybrids of Bolgarka 78 x 35-1 and 18 were hybrids of Bolgarka 78 x 1677; however, the group obtained from applying 35-1 pollen 3 hours after the other contained 8 plants showing characters from both pollen parents, together with a clear expression of heterosis; the Egyptian type of branching, yellow stamens and elongated style were combined with the red leaves characteristic of 1677, although the leaf spot characteristic of the Egyptian parent was absent. The  $F_2$  of these double hybrids also displayed morphological features characteristic of *G. barbadense* combined with the red leaf colour of

1677 and these plants also had a faint petal spot. A similar experiment in which variety 1889 was pollinated first with a red-leaved cotton and then with a form with brown lint gave rise to hybrids combining the red leaf colour with brown lint, both of intermediate shades of intensity.

In wheat crosses the white, awned variety Pseudo-meridionale 122a was pollinated first with 2 grains of Temnodymčataja [Dark Smoky] and later with large quantities of pollen of an awnless form Alborubrum with red ears; 6 of the hybrid plants combined short awns with dark smoke-coloured ear colour, while the rest were ordinary hybrids between the seed parent and one or other of the pollen parents.

The double hybrids described are attributed to multiple fertilization with pollen grains from two different pollen parents.

3236 MAKSIMENKO, I. K.

**(A cotton variety which sheds its leaves).**

Priroda (Nature), Leningrad 1955 : No. 2 : 98-100. [Russian].

A description is given of a new Turkmenian variety from a cross between strains of *Gossypium barbadense*; it sheds its leaves some days before the bolls open, thereby facilitating combine harvesting. It shows resistance to lodging, has a high ginning percentage and outyields the Turkmenian standard by 8-10%. The high productivity is largely accounted for by the large yields of cotton harvested before the frosts set in.

3237 SATO, H.

**(Embryological studies on the formation of abortive seeds or motes in cotton).**

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 23 : No. 1 : 47-50. [Japanese].

In continuation of the researches summarized in *PBA*, Vol. XXIV, Abst. 1262, the author gives figures for the frequencies of the three types of mote distinguished in the earlier paper.

3238 KUBO, K.

**(Studies on lint percentage. I. On intervarietal differences in lint percentage).**

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 22 : Nos. 3 &amp; 4 : 13-14. [Japanese].

Information on the average and range of lint percentage and seed weight in a series of Japanese, Chinese, Korean, Manchurian, Indian, Egyptian and Upland varieties under investigation at the Yamahashi Cotton Experiment



Station is given. Average lint percentage was highest in the Indian, Chinese, Upland and Japanese varieties, the respective values being 35.1%, 33.6%, 33.3% and 33.2%.\*

- 3239 **Annual Report of the Director of the Technological Laboratory of the Indian Central Cotton Committee for the year ending 31st May 1954 :** Pp. 44.

In addition to a survey of technological research, the report includes summaries of the results of spinning and fibre tests on (1) standard Indian cottons (cf. *PBA*, Vol. XXIV, Abst. 3161), (2) trade varieties and (3) improved strains and varieties developed by the State Agricultural Departments.

- 3240 GREEN, J. M. & STROUP, G. E.  
**Cotton quality as influenced by lint coarseness.**  
Bull. Okla. agric. Exp. Sta. 1954 : No. B-442 : Pp. 11.

After a brief discussion of the effect of coarseness upon market value and of the factors affecting this character, data are given on the micronaire values obtained for recommended varieties grown in different localities and seasons in Oklahoma.

- 3241 **Summary of fiber and spinning test results for some varieties of cotton grown by selected cotton improvement groups, crop of 1954.**  
Agric. Inform. Bull. US Dep. Agric. 1955 : No. 137 : Pp. 43. (Mimeographed).

Detailed tables showing the qualities and processing behaviour of a number of varieties grown and tested in various American states in 1954 are presented.

- 3242 UNDERWOOD, C.  
**Some impressions of the work in progress at cotton breeding stations in the Sudan and East Africa.**  
Emp. Cott. Gr. Rev. 1955 : 32 : 83-92.

Breeding in progress at various stations and the methods of grading and testing for quality employed are briefly surveyed and discussed, emphasis being laid on the need for strains free from the tendency to form nep.

- 3243 HUTCHINSON, J. B.  
**Observations in the American Cotton Belt.**

Emp. Cott. Gr. Rev. 1955 : 32 : 78-82.

In this short general account of cotton growing in the USA it is reported that two of the main

breeding objectives at the present time are the incorporation of the high fibre strength of Hopi cotton into other varieties and the transference of characters of economic value from wild species and Asiatic material to American cotton.

- 3244 **New strain of cotton reported.**  
What's New Crops Soils 1955 : 7 : No. 4 : p. 23.

Strain 8893, a new Upland cotton produced at New Mexico College, equals 1517C in tolerance of *Verticillium* wilt, yields 10% more lint and has greater fibre strength.

- 3245 MÉNDEZ, D.  
Comportamiento de las selecciones Tangüis en suelos altamente infectados por el *Verticillium* wilt—1951-52 y 1952-53. (**Behaviour of Tangüis selections in soils highly infected with *Verticillium* wilt in 1951-52 and 1952-53**).  
Bol. trimestr. Exp. agropec., Progr. Coop. Exp. Agropec., Lima 1954 : 3 : No. 4 : 5-12.

Observations on ten wilt-resistant selections of Tangüis cotton showed line LM.W 395-42 to be the most suitable for the low-lying areas of the Rímac and Chillón valleys of Peru and LM.W 467-45 and LM.W 12-40 for medium altitudes of the Chillón valley.

- 3246 **Seed bulletin. Fibre flax.**  
IVRO, Wageningen 1955 : Pp. 7.  
This bulletin is an English version of that summarized in Abst. 2224.

- 3247 KHRISTIDIS, B. [G].  
(**Flax experiments in 1952-53**).  
Georgikon Deltion (Agric. Bull.)/Bull. Agric., Athens 1954 : 3 : No. 8 : 87-94. [Greek].

Varietal trials of Redwing, Royal, Baladi [Local], Hindi, 8 varieties from the Netherlands and 4 Greek varieties are reported. Data are given on seed yield and stem production.

- 3248 SIZOV, I. A.  
(**Influence of conditions of growth on the formation of agriculturally valuable characters in flax**).  
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 19-28. [Russian].

In an attempt to produce a fibre flax with larger seeds a number of crosses were made between Tekstilščik [Textile-worker] as seed parent and an Egyptian flax with a 1000 seed weight of

\* 33.2% in the text, 32.2% in the table.

11–12 g., as compared with 4–4.5 g. in Tekstiljščik. The Egyptian parent was grown for two generations in the Leningrad region before crossing, after which both parents were sown in in the Kubanj, a region to which neither belonged, and crossed there; part of the hybrid seed was sown near Leningrad and part in the south near Krasnodar. From the hybrid material grown for three generations near Leningrad some forms were selected which exceeded Tekstiljščik in height of plant; the average height of Tekstiljščik was 101–106 cm. and that of the Egyptian parent 71–73 cm., whereas some of the hybrids reached a height of 132–146 cm. In the material grown at Krasnodar no hybrid exceeded the taller parent in height but some of the tallest plants had a 1000 seed weight of 8.3 g., which was somewhat higher than that of the tallest plants in the northern material.

The flax Pobeditelj [Victor] was crossed with a Central Asian form characterized by a large number of stems. The  $F_1$  plants inherited this feature but their stems were much shorter; when pollinated with Pobeditelj they gave a back-cross generation that proved more uniform than the  $F_2$  from selfing. Selection for multiple stems was carried out in the back-cross and succeeding generations and in the fourth generation some of the multi-stemmed plants were 10–15 cm. taller than Pobeditelj, reaching a height of 112–120 cm. In stem structure and fibre production they resembled typical linen flaxes; some of them exceeded the standard variety Svetoč [Torch] in yield and quality of fibre, yielding from 11.70 to 12.81 c. of fibre per ha.

3249 PIRSON, H.

Über die Meiosis bei *Linum usitatissimum* L. (On meiosis in *L. usitatissimum* L.).

Züchter 1955 : 25 : 186–90.

Cytological investigations at the Max Planck Institute for Breeding Research, Niedermarsberg, Germany, showed *L. usitatissimum* to be a secondary polyploid with a basic chromosome number of  $x = 8$ . Meiosis was regular.

3250 POTOČANAC, J.

Dužina vegetacije i karakteristike razvoja domaćih lanova u stadiju cvatnje. (Growth period and developmental characteristics of local flax varieties during the flowering stage).

Arh. poljopr. Nauk. 1954 : 7 : 3–21.

Great differences were observed between the growth periods of vars. *bienne*, *vulgare* and

*crepitans* of *Linum usitatissimum*, that of var. *bienne* being the longest and that of var. *crepitans* the shortest. Because of their vigorous growth the spring strains of var. *bienne* proved more drought-resistant than the others. Variability in the size of flowers was most marked among the strains of var. *bienne* which have the largest flowers.

3251 WEIN, K.

Új módszer a rosttartalom és rostminőség gyors meghatározására. (Quick determination of the fibre content and quality of fibres by a new method).

Növénytermelés 1952 : 1 : 171–78.

A method of estimating the fibre content of flax from the number of fibres visible in cross sections of the stem and from the dimensions of the stem is described. Tables illustrating the application of the method to 15 flax varieties and 20 linseed varieties grown at Sopronhorpács, Hungary, are included.

3252 KNOWLES, P. F. & HOUSTON, B. R.

Inheritance of resistance to *Fusarium* wilt of flax in Dakota selection 48–94.

Agron. J. 1955 : 47 : 131–35.

Dakota 48–94 was found to possess two complementary genes,  $Fu_A$  and  $Fu_B$ , for resistance to two clones of *F. oxysporum* f. *lini* and to natural infection in one locality in California. The varieties Punjab, Punjab 47 and Dakota 48–90, with which Dakota 48–94 was crossed, were homozygous recessives for both these genes. The factors  $Fu_A$  and  $Fu_B$  did not give resistance to natural infection at another site nor to a clone derived from this source. Dakota 48–94 appeared to possess a major gene for resistance to this clone.

3253 CRESCINI, F.

Ricerche intorno al miglioramento genetico della canapa da taglio coltivata in Italia. (Investigations on the genetic improvement of fibre hemp grown in Italy).

Caryologia 1954 : 6 : 284–318.

As a contribution to future hemp breeding in Italy to increase the fibre yield per ha., the writer has carried out preliminary investigations to determine possible correlations between (a) the histological, physiological and morphological characteristics of portions of stem in ♂ and ♀ plants of *Cannabis sativa* var. *hypocotyle-viridi* and *C. sativa* var. *hypocotyle-rubro* and (b) the



content of fibre and ligneous tissue in the fully ripe stem. A statistical analysis is given of over 50 correlations studied.

The sampling technique used is fully discussed, and compared with that of Bredemann (cf. *PBA*, Vol. XXIII, Abst. 1332).

- 3254 BORTHWICK, H. A. & SCULLY, N. J.  
**Photoperiodic responses of hemp.**  
*Bot. Gaz.* 1954 : 116 : 14-29.

In experiments at the Plant Industry Station, Beltsville, Md., flowering in the variety Kentucky occurred in all plants subjected to photoperiods of 8-14 hours. With photoperiods of 16-20 hours flowering was incomplete and greatly delayed. Production of ♂ flowers on a greater percentage of ♀ plants was obtained by (1) applying a full intensity of natural light in contrast to lower intensities, (2) transferring plants from long photoperiods to photoperiods appreciably shorter than that critical for flowering instead of transferring them to photoperiods only slightly shorter, and (3) by exposing plants to low temperature (55° F.) before or during flower-bud formation instead of to higher temperatures. Monocism appeared to be heritable to some extent, suggesting that selection for abundant production of ♂ flowers on ♀ plants might be successful. The possible application of photoperiodic control of flowering in hemp breeding is discussed.

- 3255 **Annual Report of the Jute Agricultural Research Institute, Indian Central Jute Committee, Calcutta 1953-54 (1955) :** Pp. 145.

A small proportion of well-formed seeds was obtained from crosses between *C. capsularis* and *C. olitorius*. Investigations on the nature of incompatibility in this interspecific cross have so far indicated that retardation of pollen-tube growth is not the cause.

Vegetative rapprochement has not been successful in overcoming interspecific incompatibility. Studies of the inheritance of leaf shape and size, pigmentation pattern, plant height and other characters are in progress.

No viable seeds have so far been secured from crosses between 4n forms of *C. capsularis* and *C. olitorius*. Tetraploids of *C. olitorius* were very inferior to the 2n controls in a yield trial. *C. olitorius* plants from a 2n x 4n population had 2n = 20 to 23 and were highly irregular meiotically. Wild types of *C. olitorius* and *C. capsularis* were treated with colchicine, application of the hanging drop method to seedlings proving more satisfactory than seed treatment.

The selections of *C. olitorius* and *C. capsularis* tested included derivatives of X-irradiated material. The induction of mutation by X irradiation continued.

Breeding for resistance to anthracnose and other diseases is receiving attention.

The results of variety trials at the institute and at farms in several states are summarized.

Using varieties of both species, investigations were carried out on flowering behaviour, growth components and the effects of vernalization and photoperiodic treatment upon initiation of flowering; salt resistance was studied in laboratory tests.

- 3256 LAMROCK, J. C.  
**Notes on kenaf "*Hibiscus cannabinus*" production in Cuba and Florida.**

*Agric. J. Papua New Guinea* 1954 : 9 : 6-12.

Work in Florida has indicated that resistance to *Colletotrichum hibisci* is governed by a single factor, while in Cuba the results suggest that multiple factors are involved. Other breeding objectives in Cuba and Florida include: seedling and adult resistance to diseases and pests, suitability for mechanical harvesting, improved fibre quality and high oil and protein content in the seed.

- 3257 KUWADA, H. & YAMAMOTO, K.  
**(An artificial polyploid of *Hibiscus manihot*).**

*Ikushugaku Zasshi/Jap. J. Breeding* 1954 : 4 : 175-78. [Japanese].

A description is given of a colchicine-induced tetraploid strain of the variety Akaguki [Red Stem]. The tetraploid developed more slowly than the diploid parent and the number of seeds per pod was lower.

- 3258 KUWADA, H.  
**(On differences in physiological and ecological characters between amphidiploids obtained by breeding and the parent species. XIV. Disease and insect resistance).**

*Ikushugaku Zasshi/Jap. J. Breeding* 1955 : 4 : 233-36. [Japanese].

Resistance to *Phytophthora parasitica* is low in *Hibiscus (Abelmoschus) manihot* but high in *H. esculentus* and in the amphidiploid hybrid of these two species. *H. manihot* is more resistant to the insect pest *Sylepta derogata* than *H. esculentus*, while the amphidiploid is intermediate in degree of resistance.

- 3259 NARITA, Y. & YOSHINAGA, K.  
(Studies on the breeding of *Broussonetia*. II. On the chromosome numbers of some cultivated varieties of *B. kazinoki* and *B. papyrifera* from the prefecture of Kochi).

Ikushugaku Zasshi/Jap. J. Breeding  
1955 : 4 : 222-24. [Japanese].

Chromosome numbers and guard-cell dimensions were ascertained for two varieties of *B. kazinoki* and four varieties of *B. papyrifera*. Both varieties of *B. kazinoki* and two varieties of *B. papyrifera* had  $2n = 26$  chromosomes; the other two varieties of *B. papyrifera* had  $2n = 39$  chromosomes.

## SUGAR AND STARCH PLANTS

- 3260 L., H.M.

### The sugar cane in Jamaica.

Int. Sug. J. 1955 : 57 : p. 95.

Mention is made of changes in recent years in the varietal pattern of sugar canes grown in Jamaica. BH10/12 has been discarded and the acreage devoted to B 34104 and POJ 2878 reduced very considerably. B 37172, B 37161 and the comparatively new varieties B 41227, B 42231 and B 4362 are being cultivated on an increasingly wide scale. B 4362 is described as a very early-maturing cane suitable for spring planting. B 41227 forms strong ratoons and yields a high quality juice. B 42231 is, of the three new canes, the best suited for autumn planting and does well on saline boggy areas.

- 3261 SILVA, E.

Variedades de caña de azúcar cultivadas en Puerto Rico, 1952-53. (Varieties of sugar cane cultivated in Puerto Rico, 1952-53).

Bol. Estac. exp. agríc. PR 1954 : No. 121 : Pp. 21.

A census of the sugar canes in the island showed that in the year in question 54 different varieties were grown, the most popular being POJ2878, followed by M336. Some of the more progressive growers are cultivating more modern varieties. Comparison with the previous census of 1949 shows that BH10(12) had ceded second place to M336 and that B37161, B34104, PR902 and PR905 had also gained in popularity.

- 3262 Tenth Annual Report of the Indian Central Sugarcane Committee  
1953-54 (1955) : Pp. 124.

Hybridization of *Saccharum officinarum* with *S. spontaneum* results in an increase in vigour and yield but a decrease in quality. Subsequent mobilization involving the reduction of the number of *S. spontaneum* chromosomes to eight

improves the quality without depressing the yield. Parthenogenesis has been found to occur in certain Co. varieties and comparative cytomorphological studies of selfed seedlings of *S. robustum* and naturally occurring forms have indicated that parthenogenesis, with or without elimination of chromosomes, is of importance in speciation. In studies of *S. officinarum* x *Sclerostachya* it has been found that the presence of a high proportion of *Sclerostachya* chromosomes in the hybrid results in an acceleration of flowering. A study of the variants of *Saccharum robustum* has indicated that four chromosomes are common to this species and the genera *Sclerostachya* and *Narenga*. Synthetic hybrids have been obtained which resemble naturally occurring forms of *S. spontaneum* both morphologically and in chromosome number and configuration.

Exposure to long days inhibited flowering in early varieties of *S. officinarum* and delayed it in late varieties. Early flowering was induced in late types by short-day treatment and late flowering in early varieties by long day followed by short-day treatment.

Two *S. spontaneum* variants from West Bengal are reported to have the chromosome number  $n = 20$ . It has been confirmed that the size of pollen grains, stomata and the long epidermal cells of the stem of *S. spontaneum* variants is related to chromosome number, but no correlation could be established between chromosome number and plastid characters. Spikelet characters varied considerably and showed little relationship to other characters.

In tests of isolates of six dark forms of *Colletotrichum falcatum* and 26 light forms on ten standard cane varieties, the former gave uniformly low infection while the latter varied but were generally more virulent than the dark forms. When mixtures of various dark and light isolates were tested it was found that dark/light mixtures were usually more virulent than light/light or dark/dark mixtures or individual strains.

Information is given on varietal trials, mill tests and tests for resistance to *Colletotrichum falcatum*, *Ustilago scitaminea* and cane borers at Coimbatore and stations in Uttar Pradesh and Bihar. Co. S443, a red-rot resistant cane of good quality, has been released in Uttar Pradesh and Co. S510 and Co. 65 are soon to be released.

- 3263 Annual report of the experiment station of the South African sugar association, 1953.

S. Afr. Sug. Yearb. 1953-54 : 79, 172-82.

It has been found that in some varieties



methoxyethyl mercuric chloride at a concentration of 4.5 p.p.m. greatly stimulates rooting in the detached shoots used in pollen fertility studies; in other varieties it stimulates the growth of lateral buds and appears to retard the development of the inflorescence. Ovule and pollen fertility were increased in many varieties by keeping the developing inflorescences at higher temperatures than normal. Preliminary experiments have indicated that female tassels pollinated every third day may set as much seed as those pollinated daily. Eight seedlings from the cross N : Co.310 x *Sorghum verticillatum* have been obtained. Intervarietal crosses and crosses of commercial varieties with *Saccharum robustum* and *S. spontaneum* have been effected. Numerous varietal trials have been held. A list of the varieties maintained at the station is appended.

**3264 Annual Report for 1954 of the Mauritius Sugar Industry Research Institute : Pp. 86.**

Many crosses were effected, a list of which is given. Greater use was made of parents involving two or three species in their origin. To gain information on the prototypes of wild lines, the selfed progenies of Javanese clones of *Saccharum spontaneum* are being studied. The Barbados canes B3337, B37161 and B37172 were added to the list of approved varieties in 1953. The percentage of open anthers in M63/39 is correlated with altitude, anther fertility decreasing at greater heights.

**3265 POLO, J. T.**  
La caña Fandiño Especial. (The cane Fandiño Especial).  
Bol. Asoc. Téc. azuc. Cuba 1955 : 13 : 707-09.

The sugar cane Pepecuca or Baraguá 114-35 has been named Fandiño Especial [Special Fandiño] by the planters in Cuba, where it is giving better yields of cane and sugar than the Coimbatore or Java canes and gives better results in the factory.

**3266 GÓMEZ A., F. & CAMPOS G., H.**  
Variedades de caña de azúcar. (Sugar-cane varieties).  
Agricultor venezol. 1954 : 19 : No. 173 : 14, 45.

A list is given of the cane varieties being tested by the Ministry of Agriculture in Venezuela; some are serving for introduction into cultivation and others for hybridization, several thousand crosses being made every year.

**3267 1954 Report of the Experiment Station Committee of the Hawaiian Sugar Planters' Association : Pp. 80.**

Data on chromosome numbers of material in the Kailua collection is throwing light upon the relationships among some groups of canes. The varieties 39-7028, 44-2364 and 44-3098 are outstanding as parents giving a high proportion of promising seedlings. Germinating seed pieces are being treated with  $\gamma$  rays in the expectation of producing mutations. Further crosses were effected, chiefly by the melting-pot technique.

**3268 TEMBHEKAR, V. V. & DIVEKAR, M. V.**  
Inherent characteristics of sugarcane varieties for better gul quality.

Poona agric. Coll. Mag. 1954 : 45 : 62-63.  
Of the three varieties Co. 419, 658 and 475, the last-named was best in respect of gul quality. High gul quality was associated with low ratios of total N/protein N, CaO/P<sub>2</sub>O<sub>5</sub> and colloids/P<sub>2</sub>O<sub>5</sub> in the juice, and with high P<sub>2</sub>O<sub>5</sub>, and low K<sub>2</sub>O and low total N contents.

**3269 BUZACOTT, J. H.**  
Vigorous seedlings.

Cane Gr. quart. Bull. 1955 : 18 : 115-17.  
Seedlings with *Saccharum robustum* '51NG63' as one parent show considerable vigour, those from Badila ♀ x 51NG63 ♂ being outstanding in this respect. In New Guinea, where it was collected, this wild variety also appeared to be highly resistant to downy mildew.

**3270 ROD, J. & VRESKÝ, F.**  
Vyšetřování světelného stadia různých odrůd čiroků. (An investigation of the light phase in different sorghum varieties).

Sborn. čsl. Acad. zeměd. 1955 : 28 : 21-32.  
Early emergence and full development of panicles by all sweet sorghum varieties was the most perceptible response to 8 hour photoperiods for 32 days.

**3271 WAUTHY, R. & ROUSSEL, N.**  
Les résultats des essais de variétés de betterave sucrière en Belgique de 1950 à 1954. (The results of sugar-beet variety trials in Belgium from 1950 to 1954).  
Publ. Inst. belge Amélior. Better. 1954 : 22 : 215-29.

Tabulated data on the results of trials conducted at a large number of centres during 1950-54 are presented. Among the varieties giving high yields of both roots and sugar were Adefa 17-E, Hilleshög R Polyploid, Hilleshög Standard N

Polyploid, Kleinwanzleben Polybeta, Kleinwanzleben E, Maribo P, Zwaanese III E, Desprez N and Kleinwanzleben Original E. Kleinwanzleben Z proved comparatively resistant to bolting. Schreibers N and Pedigree E produced high yields of leaves.

3272 HUDSON, P. S.

**Sugar beet. It's a different plant to-day . . .**

Agric. Rev., Lond. 1955 : 1 : 31-37.

Advances in sugar-beet improvement, from the selection first applied two centuries ago up to the most recent developments in breeding in various countries, such as the production of monogerm lines and  $F_1$  hybrids, are outlined and the possibilities of further improvement by the new methods are assessed.

3273 MAZLUMOV, A. L.

**(Improving the sugar content and quality of sugar beet).**

Agrobiologija (Agrobiology) 1955 : No. 1 : 32-44. [Russian].

An account of breeding work on sugar beets at the Ramonj breeding station, with an emphasis on breeding for high sugar content and good technological properties, is presented. Brief mention is made of new varieties that combine high sugar content and root yield. These include vegetative hybrids, obtained by grafting Z type scions on E type stocks.

3274 FEDENEVA, T. V.

**(Questions concerning the breeding of sugar beet for improved sugar content).**

Agrobiologija (Agrobiology) 1955 : No. 1 : 153-55. [Russian].

This account of a joint conference of the Lenin Agricultural Academy and USSR Ministry of Agriculture held in November 1954 briefly mentions some reports dealing with the breeding and selection of sugar beet.

3275 PUZIKOV, D. N.

**(Sugar content of standard varieties of sugar beet).**

Zemledelie (Agriculture) 1955 : No. 2 : 101-04. [Russian].

Data showing comparative performance of new standards and older varieties of sugar beet are presented. Many new varieties have 0.1-0.5% higher sugar contents than the older varieties and all of them produce 0.4-7.1% more sugar per ha. Verhnjačka 020 and Ramonj 931 are outstanding among the new varieties in that they combine high sugar content with good root yield. Their respective sugar contents are 20.1-20.9% and 16.5-19.6%. Verhnjačka 020

may yield up to 60.8 c. and Ramonj 931 up to 67.9 c. sugar per ha.

3276 CSITKOVICS, A.

**A párosenyésztés cukorrépanemesítési módszer eddigi eredményei. (Preliminary results of breeding sugar beet by the method of pairing).**

Növénytermelés 1952 : 1 : 161-70.

High seed yields in the  $F_0$  and 20-30% improvement in the yield of sugar per unit area in the  $F_1$  have been obtained by splitting the roots of selected beets into six sections and growing the resultant plants in a chequer-board layout so that appropriate pairs of strains can open-pollinate each other. The best results were obtained from intervarietal combinations.

3277 VARGA, A.

**Előzetes jelentés répa fajhibridekről. (Preliminary report on sugar beet hybrids).**

Növénytermelés 1952 : 1 : 151-54.

Hybrids of *Beta trigyna* x *B. maritima* which can be crossed both with *B. trigyna* and with *B. vulgaris* have been obtained at Sopronhorpács. By using *B. maritima* as a bridge species, segregates combining characteristics of *B. trigyna* and *B. vulgaris* and containing  $2n = 18$  chromosomes have been isolated.

3278 UZUNOV, V. N.

**(Valuable varieties of sugar beet).**

Sahar. Promyšl. (Sug. Industr.) 1955 : No. 1 : 33-34. [Russian].

The results of testing two new N types, one originating from Verhnjačka and the other from Ramonj, are reported briefly. In the Ukraine, Verhnjačka 020, which was obtained by single plant selection from Verhnjačka 023, had a 0.1% higher sugar content than the standard V1514 and produced 17 c. more roots and 4 c. more sugar per ha. Ramonj 931, a hybrid, was tested in the Ukraine, Russia and Armenia and proved more productive of roots and sugar than the E varieties Ramonj 631, Ramonj 632 and Ivanovskaja 1745 and than the Z variety Verhnjačka 1612.

3279 MARGARA, J. & TOUVIN, H.

**Analyse du comportement en champs d'essais de quelques variétés de betterave sucrière cultivées en France. (Analysis of the behaviour in experimental fields of some varieties of sugar beet cultivated in France).**

Ann. Inst. nat. Rech. agron., Paris 1954 : Sér. B : 4 : 529-37.

The results of trials of 10 varieties at 6 centres in France during 1951-53 are presented. The



yields of all varieties and their order of relative merit varied from year to year according to prevailing weather conditions. Place of cultivation, however, exercised little influence and none of the varieties tested appeared to be better adapted to one region of France than to another. In all trials, root yield was negatively correlated with sugar content. In general, Kleinwanzleben N and Tourneur GRN produced the highest yields of roots and Legland R had the highest sugar content.

3280 CURTH, P.

Temperatur und Licht als blühinduzierende Faktoren bei der Zuckerrübe. (2. Mitteilung). [Temperature and light as factors inducing flowering in the sugar beet. (2nd communication)].

Züchter 1955 : 25 : 176-81.

The second part of this article deals solely with the effect of light upon flowering (cf. Abst. 2254). Long photoperiods accelerated the rate of transition from the vegetative to the reproductive stage; short photoperiods had the opposite effect. Yellow, orange, blue or red light furthered a rapid development towards flowering; green light retarded flowering. Orange light for a period of 20 hr. per day gave the most favourable results.

3281 HOSOKAWA, S., TAKEDA, T., OTANI, Y. & IKEHATA, M.

(Cytohistological studies on male sterility in sugar beet. I. On pollen degeneration and tapetal hypertrophy).

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 196-202. [Japanese].

A detailed histological description of the development of the anther in male-sterile lines selected from Honiku 48 is given. Sterility is due to tapetal hypertrophy, similar to that described earlier for sugar beet by Artschwager (cf. PBA, Vol. XVIII, Abst. 1092).

3282 ZOSIMOVICH, V. P.

(Selecting and breeding sugar beet varieties for cultivation in squares).

Zemledelie (Agriculture) 1955 : No. 3 : 86-92. [Russian].

In districts with moderate to plentiful rainfall all varieties showed a reduction in root yield, sugar content and yield of sugar per ha. when sown in 45 x 45 cm. squares. However the reductions in the high sugar forms were less marked than in the E varieties. In arid districts

all varieties, when grown in squares, gave comparatively high root and sugar yields in spite of a slightly diminished sugar content, notably the E types. On the basis of the above observations biotypes suitable for this mode of cultivation are briefly described. These are chiefly forms that combine large roots and a high sugar content.

3283 WAKANKAR, S. M., SANGWAN, P. S. & MUNGI, Y. W.

Madhya Bharat's new pulse strains yield more.

Indian Fmg. 1955 : 4 : No. 12 : 11-12, 32.

Improved strains of green gram (*Phaseolus aureus*), black gram (*Ph. mungo*), pigeon pea (*Cajanus cajan*) and gram (*Cicer arietinum*), selected from local varieties by the State Department of Agriculture at Gwalior and Ujjain, Madhya Bharat, are briefly described and recommended for cultivation in various parts of the state.

3284 GRANER, E. A.

Tratamento de mandioca pela colquicina. III Análise comparativa entre clones diplóides e tetraplóides. (Treatment of cassava with colchicine. III Comparative analysis of diploid and tetraploid clones).

An. Esc. Agric. Queiroz 1946 : 3 : 99-140.

Further observations have been made on the tetraploids previously described (cf. PBA, Vol. XIV, Abst. 928), on the diploid clones of the variety Vassourinha Paulista from which they were derived and on certain other diploids. In the first growing season the tetraploid clones differed significantly from one another in number and weight of leaves; they differed from the diploids in having shorter stature and smaller numbers of leaves, and in a yield test they were all inferior to the diploids in yield of roots and stems, though some clones were distinctly better than others. The proportion of roots to stems was also lower in the tetraploids. In a further experiment in which the yields were determined at the end of the second growing season the ratio of roots to stems was the same in diploid and tetraploid clones, indicating that the tetraploids were later in coming to maturity; otherwise the results confirmed those from one season's growth. Some of the tetraploid clones may, in spite of their lower yield per plant, be of interest in agriculture or in horticulture, on account of their smaller size.

No significant difference in starch content was observed, either between clones or between diploids and tetraploids.

- 3285 **Bulletin of the Department of Agriculture, Zanzibar, for the quarter ending 31st December, 1954 (1955) :** No. 4/54 : Pp. 12. (Mimeographed).

The report includes a review of the work so far carried out in Zanzibar on the testing of introduced and local varieties and selections of cassava with the aim of discovering forms immune or resistant to both mosaic and brown streak. Of the varieties obtained from the East African Agriculture and Forestry Research Organization, 4697/4, 46106/27 and 46106/26, have proved to be most resistant and are to be distributed in 1955 for general cultivation; all three are third back crosses of *Manihot glaziovii* x cassava to cassava.

### STIMULANTS

- 3286 **Progress Report of the Central Experimental Farm, Tobacco Division, Ottawa, Canada, 1949-1953 (1955) :** Pp. 43.

Resistance to black root rot (*Thielaviopsis basicola*) is being transferred to cigar tobaccos from Resistant Havana 211, Nicot's nicotine-free strain 706 and *Nicotiana debneyi*. Strain 706, which is also resistant to brown root rot, is also being used as a source of root rot resistance for breeding burley, dark and flue-cured tobaccos. Strain 50165 of Greenwood has shown promise as a black-root-rot resistant burley variety. Breeding for early maturity, mainly through crossing with the early pipe tobacco Petit Havane [Little Havana], is also in progress and attempts are being made to break the apparent genetical association between earliness and a tendency to produce an excessive number of suckers. Mosaic resistance appears to be a dominant character in the flue-cured varieties Delcrest and Vamoor and the burley tobacco NN Haronova and is being incorporated into other strains. Chlorophyll deficiency, a character controlled by a single recessive gene pair, has been transferred from Consolation to other varieties with the aim of obtaining strains with a brighter-coloured and milder cured leaf.

- 3287 **New high-yielding flue-cured tobacco, Virginia 21, recommended for Virginia.**

Sth. Seedsman 1955 : 18 : No. 2 : p. 88.

Virginia 21, developed from Virginia Gold x Yellow Special-A at the Chatham Agricultural Experiment Station, Va., and placed on the list of recommended varieties by the Virginia Polytechnic Institute, is a flue-cured variety resistant to various root-rot organisms; it

produces good yields of high-quality cigarette tobacco.

- 3288 KLENIN, F. I.

(Some results of varietal trials of tobacco in the Moldavian SSR).

Tabak (Tobacco) 1955 : No. 1 : 11-13. [Russian].

The results of recent trials of established and new varieties are described. The standards Ostro-list 2747 [Pointed Leaf 2747] and Trebizond 1272 did well upon chernozem soils, while Malovata [Small] did best on light soils; otherwise most varieties exceeded them in yield and percentages of high grade leaves. The origins of a number of new hybrids, distinguished by high yield and good quality of the leaves, are mentioned. Hybrid I-199-48, from [(Dubec 481/6 x Trebizond 1867) x Krasnyĭ Dar 2518] shows resistance to drought and diseases.

- 3289 SAND, S. A.

**Heritable somatic instability in *Nicotiana* cultures derived from a hybrid of *N. langsdorffii* by *N. sanderae*.**

Diss. Abstr. 1955 : 15 : Publ. No. 10,752 : 193-94.

Data were obtained suggesting that variegations in flower colour, appearing in derivatives of the above cross and designated variegated-1 phenotypes, were determined by instability of the locus *S* for pigmentation. Assigning the symbols *s* and *S-s* to the two unstable alleles believed to be involved, the phenotypes speckled, sectorial and "rare sectorial" are postulated as having the genotypes *s/s*, *S-s/s* and *S-s/S-s* respectively. Apparently reversible changes between the *s* and *S-s* conditions resembled inhibition and release from inhibition of the locus.

- 3290 SAND, S. A., SMITH, H. H. & SPARROW, A. H.

**Stimulation by chronic gamma irradiation of the spontaneous rates of heritable somatic instabilities in a clone of *Nicotiana*.**

Genetics 1954 : 39 : 991-92. (Abst.).

Flowers of a clone of interspecific origin displayed a high rate of somatic spontaneous mutation for one locus and a much lower rate for another. These mutations caused sectors of speckled and purple tissue in normally red petals respectively. In experiments on the effects of chronic  $\gamma$  irradiation, the frequency of purple sectors increased linearly with dosage, whereas the relationship between the frequency of speckled sectors and dosage was nonlinear; the frequency of speckled sectors was ten times



greater than that of the purple sectors for doses below 12 r. per day. Seasonal differences in the frequencies of mutation were obtained. The possible causes of the high degree of instability of the locus for speckled tissue are briefly discussed.

3291 SCARASCIA, G. T.

Azione di alcuni alcaloidi sulla germinazione del tabacco e sulle mitosi di apici radicali. (**The action of some alkaloids on germination of tobacco and on mitosis of root tips**).

Tabacco, Roma 1955 : 59 : 133-53.

Different concentrations of caffeine, theobromine, quinine, atropine and nicotine were tested for their effects on (1) the germination of seeds of *Nicotiana tabacum* and (2) cells and nuclei of root meristems of *N. tabacum* and *Allium cepa*. In no case did the treatment increase germination in tobacco seed.

From the combined cytological findings on both tobacco and onion, the author concludes that development of the embryo was retarded, in association with induced structural anomalies of chromosomes, polyploid nuclei or multinucleate cells, chromosome agglutination, inhibited mitosis and lethal changes in chromosomal or other nuclear structures, e.g. deformations or vacuolization.

3292 SCARASCIA VENEZIAN, M. E.

Osservazioni enzimatiche su *Nicotiana glauca* e sul suo autotetraploide *N. diglauca*. (**Enzyme observations on *N. glauca* and its autotetraploid *N. diglauca***).

Ann. Sper. agr. 1955 : 9 : 661-65.

Examinations of seeds and leaves of *N. glauca* ( $2n = 24$ ) and *N. diglauca* ( $2n = 48$ ) showed the diploid to have a higher catalytic activity than the tetraploid; the activity in respect of polyphenol oxidase and carbonic anhydrase in the seeds was slightly higher in the tetraploid but in the leaves the diploid was much the more active. It is thought that the lower enzymatic activity of the tetraploid may be one of the factors responsible for its meiotic irregularity and reduced fertility.

3293 RAEER, J. G.

**Effect of transplanting techniques on the uniformity of tobacco experiments.**

S. Afr. J. Sci. 1955 : 51 : p. 253.

Of the three techniques tested, transplanting about 2-inch high seedlings into 4-inch deep paper-band containers in greenhouse flats,

followed by field planting at the normal size, was concluded to be most satisfactory for genetic and agronomic experiments.

3294 FRIMMEL, F.

**Dynamická tabákometria. (Dynamic tobacco metrics).**

Pôdohospodárstvo 1954 : 1 : 264-88.

A biometrical method for describing the course of development of the stem and leaves of tobacco has been devised at the Tobacco Research Institute at Velký Báb in Czechoslovakia. The method is recommended for varietal discrimination and for evaluating breeding material.

3295 IYAMA, S.

**(Genetical studies on the midrib proportion and leaf shape of tobacco).**

Ikushugaku Zasshi/Jap. J. Breeding 1955 : 4 : 203-07. [Japanese].

The genetics of midrib proportion (midrib weight/total leaf weight), leaf shape (leaf breadth/midrib length) and leaf size (midrib length x leaf breadth) were investigated in the  $F_1$ - $F_3$  of crosses of representative members of a series of American and Japanese varieties. Midrib proportion and leaf shape showed a high negative correlation.

The variances of midrib proportion and leaf shape were partitioned into their *D*, *H* and *E* components according to Mather's method (cf. *PBA*, Vol. XIX, Abst. p. 913). It was concluded that midrib proportion and leaf shape were controlled by 4-5 and 1-2 pairs of effective factors, respectively. Heritability values for midrib proportion and leaf shape were high. It is suggested that, in view of the correlation between these characters, selection for midrib proportion could be appropriately based on a selection index  $I = X_m - 0.352 X_s$ , where  $X_m$  represents midrib proportion and  $X_s$  leaf shape.

3296 HEGGESTAD, H. E., CLAYTON, E. E. & FELTS, J. H.

**For burley growers—wildfire-resistant tobacco.**

Tenn. Fm. Home Sci. 1954 : No. 11 : 4-5.

The line TL106, to which resistance to wildfire was transferred from *Nicotiana longiflora*, has been used in breeding in Tennessee since 1947. Of the wildfire-resistant lines developed, GR25 is considered to be the most promising under trial; it has good quality and is also resistant to mosaic and black root rot. Lines combining resistance to the three diseases already mentioned and also to *Fusarium* wilt and blackshank

have been produced but require further testing for several years.

**3297 Two tobaccos from Coker's.**

Sth. Seedsman 1954 : 17 : No. 10 : 49, 65.  
The varieties Coker 139 and 140, the former highly resistant and the latter moderately resistant to black shank, are both high-yielding cigarette tobaccos of good quality with moderate resistance to *Fusarium* and Granville wilts. They were developed by Coker's Pedigreed Seed Co., Hartsville, SC, from a multiple cross involving Golden Cure, Dixie Bright 101, Golden Wilt and Oxford I-181.

**3298 (Newly registered tea varieties).**

Chagyo Kenkyu Hokoku/Tea Res. J. 1954 : No. 4 : 76-80. [Japanese].  
Details are given on the origin, botanical characteristics, quality and productivity of the green tea varieties Natsumidori, Yaeho, Asagiri, Kiyomidori and Hatsumidori and the black tea variety Benikaori.

**3299 MASUDA, K.**

**(On a method of emasculating tea flowers).**  
Chagyo Kenkyu Hokoku/Tea Res. J. 1955 : 30 : No. 5 : 6-7. [Japanese].  
A technique in which the anthers are removed by cutting the buds transversely with scissors is described. This method is said to be an improvement over that in which the anthers are detached with forceps.

**3300 SIMURA, T. & INABA, T.**

**(On polyploidy in the tea plant. II. The induction of 4-ploid tea plants by means of colchicine treatment).**  
Chagyo Kenkyu Hokoku/Tea Res. J. 1953 : 28 : No. 1 : 5-7. [Japanese].  
A description of a tetraploid strain of the variety U-15 obtained by colchicine treatment is provided. So far the tetraploid has proved slow-growing and of dwarf habit.

**3301 TOMO, N., FUCHINOUE, Y. & YAMANE, H. (Studies on the germination of the pollen of the tea plant).**

Chagyo Kenkyu Hokoku/Tea Res. J. 1953 : 28 : No. 2 : 23-27. [Japanese].  
Data are provided on the percentage germination of the pollen grains of a series of Japanese varieties on media derived from self styles or from styles of other varieties. Differences were noted in the percentage pollen germination of the various varietal combinations; germination was usually poorer on the media derived from self styles.

**3302 WATANABE, A. & HARADA, S. (Studies on the method of early selection in tea breeding. I. The results of taking cuttings and the growth of the established shoots).**  
Chagyo Kenkyu Hokoku/Tea Res. J. 1955 : 30 : No. 5 : 1-5. [Japanese].

Comparative investigations of a series of Japanese strains showed that a high correlation existed between the growth rate of cuttings and the growth rate and survival of transplanted bushes derived from them. It should therefore be feasible to select for vigour at an early stage.

**3303 KAWAI, S. & ISHIGAKI, K.**

**(On the content of manganese in tea leaves and tea-garden soils).**  
Chagyo Kenkyu Hokoku/Tea Res. J. 1954 : 29 : No. 3 : 71-74. [Japanese].

During the course of this investigation, differences in the manganese content of the leaves were noted in a series of eight Japanese varieties.

**3304 HARADA, S. & AMMA, S.**

**(Some considerations on the relations between plucking time and the growth and yield of tea buds in tea varieties).**  
Chagyo Kenkyu Kokoku/Tea Res. J. 1955 : 30 : No. 5 : 18-23. [Japanese].

Components of yield were analysed in the first and second pluckings of four Japanese varieties. In Yabukita and Natsumidori, number of buds was a more prominent yield component than in Miyoshi and Tamamidori, where weight per plucked shoot was relatively more important.

**3305 MATSUI, H.**

**(The relation between the refractive index of the cell sap of tea leaves and the resistance to cold in the winter season).**  
Chagyo Kenkyu Hokoku/Tea Res. J. 1953 : 28 : No. 2 : 32-33. [Japanese].

A comparative study of six Japanese varieties revealed a tendency for cold resistance to be associated with high refractive index.

**3306 MATSUI, H.**

**(The relation between the refractive index of the cell sap of tea leaves and the resistance to cold in the winter season).**  
Chagyo Kenkyu Hokoku/Tea Res. J. 1953 : 28 : No. 2 : 95-97. [Japanese].

Notes on the origin, characteristics and adaptability of 15 registered Japanese varieties are given.



- 3307 HARADA, S., WATANABE, A. & KANO, T. (**Studies on intervarietal differences in the resistance of the tea plant to cold. I. The resistance of young tea buds to cold in a warm winter spell.**)

Chagyo Kenkyu Hokoku/Tea Res. J. 1954 : 29 : No. 4 : 1-5. [Japanese].

The resistance to cold of the buds of 11 Japanese varieties was tested during January, 1953, when a spell of mild weather had caused the buds to swell. Resistance was tested by transfer to a refrigerator at  $-5^{\circ}\text{C}$ . for 1-5 hr. Varietal differences in resistance to cold were noted, the most resistant varieties being the diploid Yamatomidori [Japanese Green] and the triploid U-21. The degree of resistance was positively correlated with the refractive index of the cell sap.

Varietal differences in resistance to cold were also noted at the spring flush but the order of relative resistance differed from that observed earlier.

- 3308 TOMO, N., FUCHINOUE, Y. & YAMANE, H. (**Testing resistance to cold by means of the permeability of the leaf cells in tea.**)

Chagyo Kenkyu Hokoku/Tea Res. J. 1954 : 29 : No. 4 : 6-9. [Japanese].

The connexion between resistance to cold and the permeability of plasmolysed leaf cells to solutions of sugar and urea was investigated in a series of six Japanese varieties. Resistance to cold was positively correlated with permeability to solutions of both these substances and negatively correlated with the time required for deplasmolysis. Triploids tended to be more resistant to cold than diploids.

- 3309 VAN DER KNAAP, W. P.

Blancproeven met cacao en koffie (**Uniformity trials with cacao and coffee**).

Arch. Koffiecult. 1955 : 17 : 187-239.

The results of a series of uniformity trials of cacao and coffee in Indonesia are analysed in the light of H. F. Smith's law of heterogeneity of crop yields (cf. *PBA*, Vol. VIII, Abst. 1011). In cacao, and to a slightly lesser extent in coffee, the effect of block size on variability is slight. Significant yield differences could only be inferred if they were of the order 20-30%. The coffee trials revealed a coefficient of variability of 53-78% for grafted material and 61-154% for seedlings. These values could be reduced to 50% and 60% respectively by summing over several years. The coefficient of

heterogeneity was considerably higher in seedling plantations than in plantations of grafts.

- 3310 MAISTRE, J.

Méthodes rationnelles d'amélioration des caféiers dits "de basse altitude". (**Rational breeding methods for the so-called "low altitude" coffees**).

Agron. trop., Nogent 1955 : 10 : 141-73.

It is recalled that the susceptibility of *Coffea arabica* to *Hemileia vastatrix* has resulted in its gradual replacement in the Eastern Hemisphere by *C. canephora* and *C. excelsa*, both of which are inferior to *C. arabica* in yield and in the appearance and quality of their beans. Whereas promising results have been obtained in Java and the Belgian Congo in improving these two species by selection, little attention has been paid to the question in French overseas territories. A provisional programme is therefore outlined, to include selection of promising mother trees, vegetative propagation and intraspecific and interspecific hybridization.

- 3311 **Sixth Annual Report of the Research Department of the Indian Coffee Board (1952-53) : Bull. No. 6 : Pp. 91.**

Work in progress on breeding for vigour and resistance to *Hemileia vastatrix* in Arabica and Robusta coffee includes hybridization and selfing of selected plants and conducting clonal trials. A large proportion of seedlings raised from Arabica selections have shown resistance to *H. vastatrix*. Grading of plants according to bean characters is being continued (cf. *PBA*, Vol. XXIV, Abst. 2321). A collection of foreign seed material has been established.

- 3312 DWYER, R. E. P.

**Coffee cultivation in Papua and New Guinea.**

Agric. J. Papua New Guinea 1954 : 9 : 1-5.

In the course of this article it is noted that work on the improvement of introduced Robusta strains is being carried out by the Department of Agriculture, Stock and Fisheries, Papua and New Guinea, and that some promising introduced Arabica strains are undergoing trial.

- 3313 LEUPEN, F. F.

Mededeling over de selectie en toetsing van Robusta-koffieplantmateriaal in het ressort van het Besukisch Proefstation. (**Information on the selection and testing of planting material of Robusta coffee in the area of the Besuki Experiment Station**).

Arch. Koffiecult. 1955 : 17 : 165-86.

Data on growth habit and yield, size and quality of the beans of a large number of BP, BGN,

SA and MLB clones are included in this appraisal of clonal stock at the Besuki Experiment Station, Java, after resumption of work there in 1949. On the basis of clonal trials, BP 39 and 42 are recommended for planting on a large scale. BP 46, 358, 369 and 447 also gave good results. Of the new families of legitimate seedlings that have been tested, BP4 x BP46, BP25 x BP46, BP42 x BP46, BP358 x BP368, and the reciprocals of these crosses, as well as BP369 x BP368 and BP39 x Rob BGN 83-03, appear promising.

- 3314 MENDES, C. T.  
Variedades de cafeeiros. (**Varieties of coffee plants**).

An. Esc. Agric. Queiroz 1948 : 5 : 277-91.

Extensive data are provided on the production and grade of coffee of the varieties Sumatra, Bourbon, Nacional and Amarelo de Botucatú [Yellow Botucatú] during 1932-44 in the state of São Paulo, Brazil. Wide fluctuations in both characteristics occurred from year to year even under conditions of uniform cultural treatment.

- 3315 GARCÍA BECERRA, C.  
Las investigaciones en cacao. (**Investigations on cacao**).

Cacao en Colombia 1953 : 2 : 3-16.

This review of research work on cacao carried out in Colombia includes reference to the selection work started in 1943 (cf. *PBA*, Vol. XXIII, Abst. 1813); tabular data are given on the performance of the selected trees. Studies of incompatibility have been continued (cf. *PBA*, Vol. XXIII, Abst. 2888). Observations have been made on reaction to *Colletotrichum theobromicolum*; clone SCP2 proved resistant.

- 3316 GARCÍA BECERRA, C.  
Contribución al estudio de la variabilidad de la población cacaotera de Colombia. (**Contribution to the study of the variability of the cacao population of Colombia**).

Cacao en Colombia 1954 : Suppl. 3 : 1-8.

An analysis of existing cacao plantations in Colombia has shown that while some of them consist of pure Criollo, most of them contain varying proportions of the Angoleta, Cundeamor, Amelonado and Calabacillo types, which are described and illustrated. The proportion of self-incompatible types also varies in different localities; it was found to increase in later generations of hybrids between Criollo and the Forastero types; these contained a number of completely sterile plants without flowers and others with excessive production of flowers.

The variations in fertility and compatibility are also influenced by environment and there are indications that a hormone is operative, since a nonflowering tree was induced to flower by grafting on to it some tissue of a plant that flowered abundantly.

- 3317 CARDONA, E.  
Influencia de siete insecticidas en la polinización y la fructificación del cacao, y breve estudio de los insectos polinizadores. (**Influence of seven insecticides on pollination and fruit formation in cacao, and a brief study of the pollinating insects**).

Cacao en Colombia 1953 : 2 : 41-61.

Data are given on the effects of treatment with various insecticides on the flowers of the cacao trees treated. All but Dieldrin and benzene hexachloride had unfavourable effects on fertilization and on fruit set; these two preparations were without noxious effects either on the flower or on the insects serving as pollinating agents, the main species of which are enumerated.

- 3318 KNIGHT, R. & ROGERS, H. H.  
**Incompatibility in *Theobroma cacao***.  
Heredity 1955 : 9 : 69-77.

Investigations were carried out at the West African Cacao Research Institute, Tafo, Gold Coast, to determine the compatibility reactions of trees derived from three clones of Amazonian cacao, intraclonal and interclonal crosses being made in all possible combinations. The progeny of each clone was raised from a single pod. All three progenies proved to be self sterile and to a limited extent cross fertile. Two progenies were each divided into three intrasterile but interfertile groups; the progeny of the third cross consisted of one intrasterile, interfertile group and three intrasterile but incompletely interfertile groups. Upon cross pollination of trees belonging to all the different groups making up the three progenies, several groups proved to be cross sterile. Incompatibility occurred after the pollen tubes had penetrated the ovules. The authors postulate a system of multiple *S* alleles, with sporophytic control of incompatibility. They suggest that five alleles were present, exhibiting dominance according to the sequence  $S_1 > S_2 = S_3 > S_4 > S_5$ . This incompatibility system is discussed in relation to the dominant reaction between *S* alleles and the antigen-antibody theory of incompatibility. It is suggested that active substances involved in the incompatibility are confined to the cytoplasm of the ovules and pollen.



- 3319 RESTREPO P., H.  
Frutos partenocárpicos en cacao. (**Parthenocarpic fruits in cacao**).  
Cacao en Colombia 1953 : 2 : 155-61.

A number of cacao clones in Colombia, among them those characterized by highest productivity, are showing increasing tendencies to produce parthenocarpic fruits. In experiments with a number of plant growth substances, fungicides and insecticides, no parthenocarpic fruits were induced and the phenomenon would seem to be either genetic in origin or alternatively some form of degeneration.

- 3320 JARY, C. L.  
**The new varieties of hops.**  
Agriculture, Lond. 1955 : 62 : 30-34.

In this survey of hop breeding in England since 1900 the need for wilt-tolerant varieties is stressed; D1 and J2 appear to be the most promising seedlings so far produced and further breeding and selection have been jointly undertaken by East Malling Research Station and Wye College. The production and use of triploids is under investigation at Wye. It is noted that most of the new varieties are suitable for mechanical harvesting.

## MINOR CROP PLANTS

- 3321 GENTRY, H. S.  
**Apomixis in black pepper and jojoba ?**  
J. Hered. 1955 : 46 : p. 8.

In Travancore the writer observed that a variety of *Piper nigrum* known as Kotanadan or Judaravalli bore stamenless flowers which appeared to develop normal fruits and seeds. No staminate flowers were found in the vicinity of the planting and no insects are known to be pollinators of black pepper. Embryological investigations are required.

- 3322 IIZUKA, M.  
**(Studies on the fertility of artificially-induced polyploid plants. II. The duration of potency in *Capsicum annuum*).**  
Ikushugaku Zasshi/Jap. J. Breeding 1955 : 4 : 229-32. [Japanese].

Comparative germination tests of stored pollen of diploid and colchicine-induced tetraploid strains of *C. annuum* are reported. The diploid pollen was more fertile, had a higher germination percentage, remained viable longer and showed a lower incidence of abnormal pollen tubes after germination than the tetraploid.

- 3323 KUMAZAWA, S., OHARA, T. & NIUCHI, K.  
**(The differentiation of red pepper varieties in Japan).**  
Engeigaku Kai Zasshi/J. hort. Ass. Japan 1954 : 23 : 152-58. [Japanese].

A series of 17 Japanese varieties was classified into 6 varietal groups, corresponding, more or less, with the groups defined by Erwin and Bailey. The principal plant characters studied were the morphology of the fruit and seed, capsaicin content of the fruit, foliage characteristics and vegetative period.

- 3324 STOKES, G. W.  
**Seed development and failure in horseradish.**  
J. Hered. 1955 : 46 : 15-21.

At the College of Agriculture, University of Wisconsin, embryological investigations were carried out on plants obtained by crossing clone C and clone P-7; the former parent originated from Common ♀ x Bohemian ♂, the latter from the back cross C x Bohemian. Seed failure was chiefly due to endosperm failure resulting from incompatibility between the endosperm and maternal tissue; seed failure due to embryo-abortion occurred much less frequently. It is suggested that deleterious mutations affecting seed production may have arisen during prolonged clonal propagation or that the sparse flowering habit and male sterility of clones of common horseradish may be the result of virus infection.

- 3325 KARTHA, A. R. S., SETHI, A. S. & GULATI, K. C.  
**Rapid estimation of yield and iodine value of oils in small samples of oil-seeds.**

Indian J. agric. Sci. 1955 : 25 : 79-84.  
Rapid estimations of the yield and iodine value of oil from seed samples weighing 0.3-0.5 g. may be made by extracting the oil with carbon tetrachloride and determining the yield gravimetrically and the iodine value by the method of Hanus. It is suggested that this technique may be of use to breeders.

- 3326 BOEV, N. D.  
**(New districts where oil plants are produced).**  
Zemledelie (Agriculture) 1955 : No. 3 : 93-97. [Russian].

Strains of *Brassica juncea* and established varieties of linseed and sunflower, adapted to the climatic conditions of Siberia and Kazakhstan and notable for their high oil contents, are mentioned briefly.

3327 OGAWARA, S.

**(Studies on snow injury in rape. On intervarietal differences).**

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 22 : Nos. 3 & 4 : 82-83. [Japanese].

Rape varieties pertaining to *Brassica campestris* are more resistant to the injurious effects of snow than *B. napus* rapes. The greater resistance of *B. campestris* is correlated with a lower content of dry matter and reducing sugar and a lower rate of carbon assimilation under normal conditions than in *B. napus*. Under snowy conditions, however, the *B. napus* rapes suffer a greater reduction in the content of respirable carbon than the varieties pertaining to *B. campestris*. Tables of the characteristics mentioned for the individual varieties under normal and snowy conditions are given.

3328 THURMAN, R. L.

**Castor bean varietal trials in Arkansas.**

Rep. Ser. Ark. agric. Exp. Sta. 1955 : No. 47 : Pp. 11.

Cimarron is concluded to be the only variety that can be recommended at present without reservation for cultivation in Arkansas. After additional testing, some of the new hybrids may prove to be suitable.

3329 **Three-way castorbean hybrid seed production now feasible.**

Sth. Seedsman 1954 : 17 : No. 11 : p. 85.

The seed from crosses of the male-sterile variety Nebraska 145-4 with certain other varieties produces male-sterile hybrids which are used as mother plants in the production of three-way hybrid seed at the Oklahoma and California Agricultural Experiment Stations. Such material is superior in yield to open-pollinated varieties and is being compared with single-cross hybrid seed.

3330 GURGEL, J. T. A.

Variação do número e da distribuição dos espinhos nos frutos da mamoneira (*Ricinus communis*, L.). [Variation in number and distribution of spines in the fruits of the castor oil plant (*R. communis* L.)].

An. Esc. Agric. Queiroz 1946 : 3 : 277-98.

A variety bearing fruits almost free from spines crossed with a variety with spines gave  $F_1$  plants having an intermediate number of spines and in the  $F_2$  there were 81 plants with spines and 19 without; the back cross gave 13 with

spines, 17 without. It was possible to distinguish homozygous spiny plants from the heterozygotes by their greater number of spines, which in fact was greater in the homozygous segregates than in the spiny parent; this is ascribed to the action of modifiers carried by the spineless parent, a view which is supported by the greater variation in spine number from plant to plant in the  $F_2$  than in the  $F_1$  or the spiny parent, and by a reexamination of the data published previously by other authors. Another spiny parent, in which the spine density was less than that in the first, also proved to be genotypically heterogeneous when the two were crossed together.

A line with laciniate leaves, in which the fruits had spineless patches, when crossed with a normal spiny line, gave an  $F_1$  in which all plants bore normal spiny fruits and an  $F_2$  in which there were 15 normal : 1 patchy; a good 3 : 1 ratio was obtained in the back cross. It is therefore concluded that two genes condition the patchy condition and they are designated  $ca_1$  and  $ca_2$  respectively. In crosses of patchy with spineless the  $F_1$  had spines uniformly distributed and the  $F_2$  gave a ratio of 45 uniform : 3 patchy : 16 spineless.

3331 ISHIBASHI, I.

**(Studies on the characteristics of the sesame varieties grown in Japan).**

Nihon Sakumotsugaku Kai Kiji (Proc. Crop Sci. Soc. Japan) 1954 : 22 : Nos. 3 & 4 : 127-28. [Japanese].

Data are presented on the pigmentation of the flowers and seeds, weight and number of fruits and volume and weight of the seeds. Some correlations between the types of pigmentation of the flowers and seeds were noted.

3332 RAMANATHAN, K.

**The effect of chemicals on the growth and mitosis in *Sesamum orientale* Linn (til or gingelly).**

Madras agric. J. 1955 : 42 : 49-55.

Treatment of root tips of *S. orientale* with 0.00001% solutions of  $\alpha$ -naphthalene acetic acid,  $\beta$ -naphthoxyacetic or phenylacetic acid accelerated mitosis, while treatment with 0.0001% solutions produced aberrations in about 40% of the mitotic cells. The abnormalities observed include abortive spindle development, formation of polyploid restitution nuclei and pycnotic masses and failure of wall formation between daughter nuclei. Cell division was completely inhibited by 0.001% solutions. Treatment with various concentrations



of acenaphthene caused slight mitotic aberrations in a few cells but had no other marked effect.

3333 ARZUMANOVA, A. M.  
(**Biological characteristics of flowering and fruit setting in sesame**).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 81-87. [Russian].

Emasculated flowers, in which the corolla was removed, when left to open pollination set no fruits at all, since no bees visited them. When the flowers were emasculated without removing the corolla, sets varying from 4.5 to 62% were obtained, according to the variety, the proximity of other varieties, weather and other conditions. Pollen stored for varying periods before being applied to the stigma retained its viability for 4 days under laboratory conditions at Tashkent at a temperature of 20-25° C.; it gave rise to fully normal progeny. Pollen collected by opening anthers due to burst on the following day also proved viable. When the variety Tashkent 122 was selfed the pollen tubes reached the ovules in about 5 hours. The stigmas of flowers emasculated at 08.00 hr. remained receptive for the whole day and most of the next.

3334 Rio and Palmetto.

Agric. Res., Wash. 1955 : 3 : No. 12 : p. 16.

Rio and Palmetto are the first nonshattering varieties of sesame to be released in the USA. The oil content of their seed is approximately 49%.

3335 HARRINGTON, J. B.

**The new selection of Victory flax (known as C.I. 1176 and Sask. 5260).**

Field Husb. Circ. Saskatch. 1954 : No. 561 : unpaginated. (Mimeographed).

A selection of Victory, developed at the North Dakota Experiment Station, has been released in Saskatchewan. This linseed is more uniform in height and maturity than the parent variety, and is resistant to all the rust races known to be present in the flax-growing districts of this province.

3336 ERMAKOV, A. J.

(**Variation in the chemical composition of plants under the influence of grafting**).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 158-76. [Russian].

Analyses were made of different parts of the

plant at different growth stages in sunflower, Jerusalem artichoke, grafts between them and an artichoke x sunflower hybrid. The hybrid was intermediate between the two parent species in carbohydrate content, with a slight tendency to resemble the artichoke more than the sunflower in the preponderance of inulin over sugars and the lower ash content; the hybrid contained 17.57% of sucrose and 24.25% of inulin compared with the sunflower control, which contained only 3.44% of sucrose and 0.99% of inulin. F<sub>2</sub> hybrids showed a greater resemblance to the sunflower parent. In chlorophyll and xanthophyll content the F<sub>1</sub> hybrid approached the artichoke more closely than the sunflower.

The composition of the grafted plants also proved to be intermediate between the parental species; the first generation seed from grafted plants was roughly equivalent to the F<sub>2</sub> sexual generation.

The seeds of sunflower grafted on to the F<sub>1</sub> artichoke x sunflower hybrid had a lower oil content but were considerably larger than the ungrafted sunflower control.

3337 MJAKUŠKO, JU. P.

(**Promising intervarietal hybrids of sunflower**).

Agrobiologija (Agrobiology) 1955 : No. 2 : 118-19. [Russian].

The substance of this article has been summarized in Abst. 1326.

3338 **The West African Institute for Oil Palm Research.**

Niger. Inform. Serv., Lagos 1954 : Pp. 79.

In the course of a chapter describing the general research carried out at the Institute, a brief account of the Mendelian inheritance of fruit characters in the oil palm (cf. *PBA*, Vol. XIII, Abst. 918) is followed by a survey of the work of the Plant Breeding Division. Numerous progeny trials are being conducted with the aim of making a more detailed study of the inheritance of fruit characters, particular attention being paid to plants intermediate in type between the thick-shelled *dura* and the desirable *tenera* forms. A large number of *dura* x *pisifera* crosses have been effected to produce high-yielding palms of the *tenera* type. In addition, selected *dura* palms are being crossed to provide high-yielding *dura* parents, and *tenera* plants are being crossed to give *tenera* types as well as *pisifera* parents of improved breeding value. The technique used in making artificial pollinations is described. The dumpy form of the Deli palm is being introduced.

- 3339 MOTHES, K., ROMEIKE, A. & SCHRÖTER, H.-B.  
Über Mutationsversuche an Alkaloidpflanzen. (**On mutation experiments with alkaloid plants**).

Naturwissenschaften 1955 : 42 : p. 214.

It is suggested that alkaloids may be essential to the growth processes of plant species normally containing these substances. This hypothesis would explain the fact that, although a large number of mutants with a considerably reduced alkaloid content were obtained by X irradiating *Nicotiana* spp. and *Datura* spp. at the Institute for Research on Crop Plants, Gatersleben, Germany, no plants completely devoid of alkaloids were found. Examination of large numbers of sweet lupins and tobacco varieties with a low alkaloid content also failed to reveal the presence of plants containing no alkaloids.

- 3340 DELČEV, G.  
(**A form of belladonna with a high alkaloid content**).

Izv. Inst. Rastenievădstvo (News Inst. Pl.-Industr.), Sofia 1954 : 105-20. [Bulgarian].

An account is given of selection work in Bulgaria on a Czechoslovakian population of *Atropa belladonna* comprising natural hybrids of a form with a high alkaloid content, characterized by yellow stems, leaves, flowers and berries. The required type has now been obtained in a nearly pure state by continuous selection for yellow flower colour and by vegetative reproduction of the selected material. It has an alkaloid content of 0.7968%, an appreciable improvement on that of the initial material.

- 3341 Institut des Recherches sur le Caoutchouc en Indochine. Rapport Annuel 1953. (**Institute of Research on Rubber in Indochina. Annual Report 1953**).  
1954 : Pp. 183. (Mimeographed).

In addition to information on selection work and clonal trials at the Laikhê and Tapao Experiment Stations, Viêt-Nam, data on differences between clones in the mineral contents of their leaves and latex and on the effect of various chemical fertilizers and growth-promoting hormones are presented. Of the IRCI series, clones 1, 6, 7 and 10 gave the best results. High yields were also obtained from Pil 16-B, OY1, PR107 and AVROS427. A large number of crosses have been effected between different clones, the most promising results being obtained from Dj.1 x Tjir 1, OY1 x Tjir 1, AVROS152 x BR2 and the IRCI clone Phuoc-Hoà x Tjir 16.

- 3342 EVERS, M. E.  
La présélection en hévéaculture. (**Preselection in rubber growing**).  
Bull. INEAC 1955 : 4 : 77-81.

Preselection of seedlings has given encouraging results at the Yangambi Research Station, Belgian Congo, where it has been found possible to estimate the yield potentialities of a seedling at an early stage in its development by employing the Testatex and Morris-Mann techniques.

- 3343 **Planting recommendations, 1955-6.**  
RRI Plant. Bull. 1955 : 46-49.

Notes are provided on the characteristics and performance of the following rubber clones recommended for planting in Malaya: PB86, Tjir 1, RRIM501, RRIM513, PR107, Glenshiel 1, LCB1320, GT1, RRIM526, PB5/51 and PB5/63. The last five clones are only recommended for planting on a limited scale.

- 3344 TIXIER, P.  
Contribution à l'étude des facteurs de résistance de l'hévéa aux maladies de feuilles en général et à l'oïdium en particulier. (**Contribution to the study of resistance factors in Hevea to leaf diseases in general and, in particular, to Oidium**).

J. Agric. trop. Bot. appl. 1954 : 1 : 414-30.

Leaf diseases attacking rubber trees in Indochina are listed and their symptoms described. Recent studies in Cambodia and Southern Viêt-Nam have shown a high positive correlation between resistance to *O. heveae* on the one hand and, on the other, the rate of growth of the trees, the stage in the development of the leaf at which the cuticle begins to form and the time taken by the cuticle to harden.

## FRUITS AND NUTS

- 3345 NEUMANN, D.  
Über die Variabilität der Wuchsleistung von Obstgehölzen in der Baumschule. (**On the variability in growth of fruit trees in the nursery**).  
Züchter 1955 : 25 : 140-53.

A statistical analysis of shoot length and diameter in first-year scions of a series of apple, pear and plum varieties grafted on various stocks is presented. The plants were raised in the Ernst Thälmann Nursery, Ketzin (Havel). Correlation coefficients between length and diameter of shoot were worked out. Variability in the growth in the one-year-old scions was relatively low.



- 3346 RODIONOV, A. P.  
(**Development of new varieties of fruit trees and soft fruits in the Ukraine**).  
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 :  
No. 6 : 43-46. [Russian].

This brief outline of the breeding work at various branches of the Ukrainian Horticultural Institute mentions new varieties of pome and stone fruits, including some apricots originating from Nežin and peaches from Kiev, that are notable for high quality and tolerance of low temperatures. New strawberry varieties, distinguished by early maturity, high yield and large fruits, are also referred to.

- 3347 LIŪS, M. V.  
(**Effects of a mentor and of external conditions upon development of new varieties**).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 :  
No. 6 : p. 47. [Russian].

The effect of the scion upon stock was observed in some frost-damaged apple, pear, plum and cherry trees in Estonia. The stocks gave rise to shoots that resembled the scion rather than the stock but surpassed the scion in earliness, yield and fruit quality.

- 3348 Standardsorter av äppel. (**Standard varieties of apple**).

Tidskr. Lantm., Helsinki 1955 : 37 : p. 55.

A table is provided giving information on the adaptation to different parts of Finland, time of ripening, keeping quality, suitable pollinators, fruit size and flavour, vigour and hardiness of twenty varieties.

- 3349 RUDAKOV, F. K.  
(**A new apple variety**).  
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 :  
No. 6 : p. 80. [Russian].

Mention is made of a hybrid, obtained from a cross between Borovinka and Terentjevka, that produces fruits of delicate flavour. The hybrid was grown upon two types of root, its own and that of a pear variety.

- 3350 KLEIN, L. G.  
**Introducing the "Wellington." With notes on new Delicious color sports**.  
Fm. Res. 1955 : 21 : No. 2 : p. 3.

The early, annual-bearing variety Wellington, developed at the Geneva Experiment Station, NY, from Cortland x Crimson Beauty, produces good pollen and bears attractive, red-streaked fruit which ripens evenly and is of better quality than that of most other early varieties.

Notes are given on five promising sports of Delicious and of some of its mutants; they develop a red colour early but mature at the

same time as the varieties from which they are derived.

- 3351 TARASENKO, G. G.  
(**Interspecific crosses in apples**).  
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 :  
No. 2 : 151-60. [Russian].

A brief report is given of the results of crossing *Malus baccata* vars. *genuina* and *cerasiformis* with several cultivated apples and with *M. niedzwetzkiana*, *M. ioensis* and *M. sargentii*. The characters of *M. baccata* were not fully dominant in the  $F_1$  hybrids with cultivated apples; some hybrids approached the cultivated type and this resemblance tended to increase as the seedlings grew older, especially in hybrids from crosses where the cultivated variety served as seed parent. Clear signs of variation were observed in some of the combinations; some hybrids of *M. baccata* x *M. sargentii* and *M. baccata* x *M. niedzwetzkiana* showed variation in different parts of the same plant; the latter cross gave particularly variable progenies which may be useful for breeding purposes. The cultivated varieties that gave the most promising progenies are enumerated.

- 3352 VAN DOREN, A.  
**New color sports**.  
Amer. Fruit Gr. 1955 : 75 : No. 3 : 27-28.

Information is given on colour sports of the apple varieties Starking, Richared, McIntosh and Rome Beauty under observation at the Tree Fruit Experiment Station, Wenatchee, Wash.

- 3353 SARIPOV, S. K.  
(**Promising local pear varieties**).  
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 :  
No. 6 : 49-51. [Russian].

A number of Uzbek varieties producing high quality fruits, which resemble those of the European Beurré pears, are described. All late varieties possess good keeping properties and some forms show resistance to pests and diseases.

- 3354 LOBANOV, G. A.  
(**A valuable pear variety**).  
Sad i Ogorod (Gdn. & Veg. Gen.) 1955 :  
No. 6 : 48-49. [Russian].

Ljubimica Mičurina [Mičurin's Favourite], a seedling of Lesnaja Krasavica [Forest Beauty], combines hardiness with the high quality of fruit of the southern varieties.

- 3355 KJAZIMOV, S. A.  
(**Quinces in the Lenkoran-Astarinskaja zone of Azerbaïjan**).  
Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 :  
No. 6 : 65-66. [Russian].

Descriptions are given of several varieties

interesting for a high sugar content and soft consistency of the flesh.

**3356 EVREINOFF, V. A.**

Les ancêtres de nos abricotiers. (**The ancestors of our apricots**).

J. Agric. trop. Bot. appl. 1954 : 1 : 431-40.

Notes on the geographical distribution and origin, morphological characteristics of the tree and suitability of the fruit for human consumption are presented for *Armeniaca vulgaris* and six other less important species. *A. vulgaris* appears to have its centre of origin in the mountainous districts of North-east China or Central Asia. This fact may explain its frequent failure to produce satisfactory yields when grown in low-lying districts.

**3357 PLOCK, H.**

Die Bedeutung des Fruchtsteines bei der Bestimmung von Marillensorten. (**The significance of the stone in the determination of apricot varieties**).

Mitt. Klosterneuburg 1955 : 5 : 51-56.

A method of identifying apricot varieties by the morphological characteristics of their stones is described.

**3358 FOGLE, H. W.**

**Plums in the Northwest.**

Fruit Var. hort. Dig. 1954 : 9 : p. 57.

Varieties suitable for cultivation in the north-western states of America are briefly described; they include Italian Prune, Richards Early Italian, Demaris, Weatherspoon, Stanley and President.

**3359 SJUBAROVA, E. P.**

(**New sweet cherry varieties in White Russia**).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 51-52. [Russian].

A number of new varieties, some ripe for picking in June and all distinguished by hardiness, vigour, early bearing and high yield, are described.

**3360 BALDINI, E.**

Contributo allo studio delle cultivar di ciliegio della provincia di Firenze. I. Notizie storiche e ricerche sulla biologia florale. II. Descrizione della coltura. (**A contribution to the study of the cultivars of cherry in the Province of Florence. I. Historical notes and research on the floral biology. II. Description of the crop**). Riv. Ortoflorofruttic. ital. 1955 : 39 : 105-31, 233-62.

Historical notes on various cherries of Florence are followed by an account of experiments on

the floral biology and compatibility relationships between 15 self-sterile cultivars.

In part II descriptions are presented of twelve cultivars, grouped according to time of flowering and ripening.

**3361 ABELNIEKS, P.**

(**The sweet cherry in Latvia**).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 59-61. [Russian].

Patkule, Ēdvle and Dubele, characterized by hardiness and resistance to diseases, have been selected from local material, probably of West European origin.

**3362 The Keystone peach.**

Fruit Var. hort. Dig. 1954 : 9 : p. 58.

The United States Department of Agriculture has recently released Keystone (Newday x Southland), an early yellow variety with round, attractive fruit of good flavour and texture.

**3363 YEAGER, A. F. & MEADER, E. M.**

**The Sunapee peach.**

Fruit Var. hort. Dig. 1954 : 9 : p. 58.

The hardy, yellow, freestone variety Sunapee, recently released by the New Hampshire Agricultural Experiment Station, was developed from a cross between Oriole and PI104315, a seedling selection from a hardy, white-fleshed Caucasian variety. It is of good dessert and canning quality.

**3364 SHARPE, R. H., WEBB, T. E. & LUNDY, H. W.**

**Peach variety tests.**

Proc. Fla. hort. Soc. 1954 : 67 : 245-47.

Data are given on the fruit characters, chilling requirements and ripening season of 21 varieties tested in Florida during 1949-54. New varieties noted include Maygold (cf. Abst. 1371) and Springtime, the latter originating from Robin x (Lukens Honey x July Alberta) and ripening two weeks later than Robin.

Material from the crosses Southland x Red Ceylon, Southland x Jewel and Southland x a Hawaiian seedling is being tested with a view to obtaining selections with low chilling requirements and fruit of good quality. Seedlings from Okinawa show promise as rootstocks with low chilling requirements and resistance to nematode and rust. Stribling's S-37 seedlings are also nematode-resistant.

**3365 DERMEN, H.**

**Histogenetic factors in color and nectarine sports of peach.**

Genetics 1954 : 39 : p. 964. (Abst.).

A white-fleshed somatic mutant, due to a change from the recessive to the dominant condition in a single gene, occurred in the



yellow-fleshed peach variety Elberta. A nectarine mutant arose somatically in the peach J. H. Hale. The nectarine type is ordinarily controlled by a recessive factor; this sport behaved as though controlled by a dominant factor. Variations in fruit colour of the Elberta sport and in the down development of the fruits of the J. H. Hale mutant had a histogenic basis. It was concluded that the former sport arose in L-II of the short apex and the latter in L-III.

**3366 ZAKTREGER, N. J.**  
**(Differentiation of fruit buds in citrus trees).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 161-81. [Russian].

Studies of the development of the fruit buds in a large number of *Citrus* species and hybrids and in *Poncirus trifoliata* included observations on the damage to the developing buds caused by spring frosts. In *C. sinensis*, varieties varied in the extent of damage, the buds being most resistant in the varieties Calabria and Washington Navel. Of the other species examined, *C. mitis* was the hardiest of all.

**3367 MINESY [MINISI], F. A.**  
**Sex expression in *Citrus* flowers.**

Alexandria J. agric. Res. 1954 : 2 : 37-41.

At the University of California, observations were made during 1951-2 on the percentage of flowers showing pistil abortion in 11 *Citrus* species, the Morton citrange, the Minneola tangelo and *Poncirus trifoliata*. The last-named species, a single pomelo and the five members of the acid group comprising lime, lemon and citron showed a high degree of abortion, while members of the mandarin and orange groups and the other pomelos had almost 100% perfect flowers. The Minneola tangelo (*C. paradisi* x *C. reticulata*) resembled its parents in having a very high proportion of perfect flowers. Considerable abortion occurred in the Morton citrange, a hybrid between *P. trifoliata* with 20% abortion and *C. sinensis* with little or no abortion.

**3368 MINESY [MINISI], F. A.**  
**Effect of rootstock on polyembryony in citrus.**

Alexandria J. agric. Res. 1953 : 1 : 83-90.

At the University of California it was found that, in scions of Dancy tangerine (*C. reticulata*), trifoliolate orange (*Poncirus trifoliata*) and rough lemon (*C. jambhiri*), the highest degree of polyembryony occurred on rootstocks of trifoliolate orange, the lowest on rough lemon and an intermediate degree on sour orange and sweet orange

rootstocks. Dancy tangerine varied most in degree of polyembryony and rough lemon least. The supposition that the number of embryos per seed is inversely related to the size of the embryos is not borne out by the results, which varied according to the combination of stock and scion.

**3369 KUYKENDALL, J. R.**  
**Survey of iron deficiency in Florida citrus.**

Proc. Fla. hort. Soc. 1954 : 67 : 33-38.

Data are given on the iron content of the leaves of citrus varieties from numerous localities in Florida. Pineapple orange, Temple orange and Dancy tangerine had the lowest contents of 59, 44 and 62 p.p.m., respectively, while the contents of other varieties were close to or slightly above the mean for all varieties, 66 p.p.m. The mean was higher for trees on rough lemon rootstocks than for those on sour orange.

**3370 GURGEL, J. T. A. & SOUBIHE SOBRINHO, J.**  
**Análise de poliembrião em *Citrus*, máxime em toranjas. (Analysis of polyembryony in *Citrus*, particularly in pomelos).**

An. Esc. Agric. Queiroz 1951 : 8 : 727-46.

Further observations (cf. PBA, Vol. XIX, Abst. 502) have shown that *C. pectinifera* is the species with the highest degree of polyembryony found so far, having up to 7 embryos in some of the seeds. Varying degrees of polyembryony were found in *C. hystrix* and in a lemon x lime hybrid; in all cases the distribution of polyembryony was found to follow a Poisson series. *C. grandis* was monoembryonic in all varieties examined except a Chinese form in which occasional seeds had 2 embryos.

**3371 SUIT, R. F.**  
**Resistant rootstock studies using the temperature tank for screening.**

Proc. Fla. hort. Soc. 1954 : 67 : 90-91.

A rapid method of screening citrus seedlings for resistance to the burrowing nematode, *Radopholus similis*, is described. No resistant material has yet been found.

**3372 MIRIMANJAN, V. A.**  
**(Studying the physiology of a mandarin vegetative hybrid).**  
Agrobiologija (Agrobiology) 1955 : No. 1 : 70-75. [Russian].

Physiological and biochemical properties of the leaves of a form which is tolerant of -16° C. and produces edible fruits larger than those of *Poncirus trifoliata* are described. The vegetative hybrid was obtained from a bud formed

at the callus of a graft of the Unshu (= Satsuma) mandarin on *P. trifoliata*.

3373 REDŽIĆ, M.

Prilog proučavanju smokava u crnogorskoj suptropskoj zoni. (**A study of the fig trees in the subtropical zone of Montenegro**).

Arh. poljopr. Nauk. 1954 : 7 : 42-67.

This paper gives descriptions of some less common varieties found in Montenegro and thus concludes the research referred to in *PBA*, Vol. XXIV, Abst. 605.

3374 ZAMOTAĬLOV, S. S.

(**Embryology of the fig tree in relation to different modes of pollination**).

Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1955 : No. 2 : 103-21. [Russian].

The results of cytological and embryological investigations of a number of varieties, including a selection from Soči, are presented. Pollination with a large amount of pollen or with pollen mixtures has not perceptibly improved the rate of growth or development of the embryo. Pollen grew on the stigma before maturation of the flower but fertilization occurred only after the flowers were ripe. Pollination of mature flowers shortened the fertilization process by 4-5 days and accelerated growth and development of the embryo even though the latter appeared to have arisen by parthenogenesis. It is thought that dissimilar progenies may be obtained by pollinating flowers before they are ripe or after maturation. When fig flowers were fertilized by the pollen of *Morus alba*, fertilization did not occur nor did the ovum develop parthenogenetically. Structural changes occurring in the cells of the central tissue of the ovule suggested nucellar embryogeny.

3375 BIANCHEDI, A.

Dal seme giapponese originario alle nuove varietà di Gelso Kokusò. (**The new Kokusò varieties of mulberry from Japanese seed**).

G. Agric. Domen. 1955 : 65 : p. 185.

The Japanese varieties of mulberry known as Kokusò 20, 21 and 27 produce larger leaves of higher nutritive value than the local Italian variety Morettiano; their leaves also develop about a week earlier.

3376 SCHRADER, O. L.

Observações sobre o melhoramento da goiabeira (*Psidium guajava*, L.). [**Observations on improvement of guava (*Ps. guajava* L.)**].

Rev. Agric., Piracicaba 1955 : 30 : 45-48.

Observations were made on a number of varieties

in respect of fruit size, form, colour and other qualities, including seed content and ascorbic acid content, and the results are tabulated. Great variation existed in all the characters studied; some forms bore fruits weighing up to 480 g.; in others the ascorbic acid was consistently higher than the average, values of 560 mg.% being attained in some. The plants with the best combinations of characters are being selected.

3377 LEDIN, R. B.

**Mango varieties.**

Proc. Fla. hort. Soc. 1954 : 67 : 284-90.

A list of 32 mangoes grown in Florida is provided and full descriptions are given of the following promising varieties: Eldon, Jacquelin, Ruby, Sensation, Adams, Earlygold and Sunset.

3378 YOUNG, T. W. & LEDIN, R. B.

**Mango breeding.**

Proc. Fla. hort. Soc. 1954 : 67 : 241-44.

Most of the better varieties grown in Florida originated as chance seedlings and only a few are the result of controlled crossing, the main obstacles encountered in breeding being the high degree of heterozygosity and the low productivity of most varieties. Trees from the cross Haden x Saigon and Haden x Malvina have yielded quite well but their fruit is mostly of poor quality. Seedling selection from bulk plantings is considered the most promising source of suitable new varieties.

3379 ŠČEPOTJEV, F. L.

(**Second growth and second flowering of the walnut**).

Bot. Ž. (Bot. J.), Moskva 1955 : 40 : No. 1 : 116-25. [Russian].

Development of abnormal vegetative and reproductive organs on trees flowering twice in the year in the Ukraine has been investigated. A description of perfect flowers found on the trees with brief notes on the significance of this type of flower in the floral evolution of the walnut is given.

3380 SPINA, P.

La coltura del pecan. Descrizione delle cultivar siciliane e ricerche sulla loro biologia florale. (**Pecan cultivation. Description of the Sicilian cultivars and investigations on their floral biology**).

Riv. Ortoflorofruttic. ital. 1955 : 39 : 148-71.

American varieties of *Carya pecan* and their distribution in various countries are discussed. Studies on the floral biology of the pecan and experiments on self and cross fertility in several



cultivars have been conducted in Sicily with reference to the possibility of promoting pecan growing in the island.

3381 KOLESNIKOV, V. A.

(Areas under nuts in the USSR).

Priroda (Nature), Leningrad 1955 : No. 2 : 31-36. [Russian].

Mention is made of various forms of nuts found in a wild state in many regions and of a number of new varieties of almonds and walnuts that have been selected in the Crimea. The almonds are interesting for their soft shells. The walnuts produce nuts that weigh up to 17.3 g. and have an oil content of 67-75.5%. Their shells are 0.6-0.8 mm. thick.

3382 BOGUŠEVSKIĬ, P. N.

(The almond in the Turkmenian mountains).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 134-41. [Russian].

In addition to a large range of forms of *Amygdalus communis* the hillsides of Turkmenia contain trees of *A. brachiuca*, an extremely drought-resistant species thought to have possibilities for colonizing certain waste areas of arid ground, and of a closely allied species *A. spinosissima*. By selection among the plants of *A. brachiuca* and *A. scoparia* collected, some promising drought-resistant rootstocks for the cultivated almond have been produced; they have a dwarfing effect and induce early bearing.

3383 TROSKO, I. K.

(Improving the management of areas under pistachio).

Les. Hoz. (Forestry) 1955 : No. 2 : 23-25. [Russian].

Mention is made of forms selected from wild material in Uzbekistan and Tadzhikistan. They are nearly equal in nut quality to the best cultivated varieties.

3384 NOORDHOFF, L.

NC-2 peanut yield high despite drought.

Sth. Seedsman 1955 : 18 : No. 5 : 42-43.

The variety NC-2, released by the North Carolina Experiment Station, produces heavy yields with a high proportion of large sound kernels. It is highly resistant to southern stem rot and has shown resistance to drought.

3385 BABU, C. N.

Cytogenetical investigations on groundnuts. I. The somatic chromosomes.

Indian J. agric. Sci. 1955 : 25 : 41-46.

A comparative study of the morphology of the

40 somatic chromosomes found in each of the 14 varieties and one hybrid investigated is presented. All the plants were characterized by the presence of a pair of small chromosomes, designated A, and all except Tennessee Red had a pair of satellited chromosomes. Varieties differed in the presence or absence of chromosomes with secondary constrictions, in the number of telophase nucleoli and in overall chromosome size, the chromosomes of bunch types tending to be longer than those of spreading varieties.

3386 VEYRET, Y.

Contribution à la cytologie du genre *Arachis*. (Contribution to the cytology of the genus *Arachis*).

Agron. trop., Nogent 1955 : 10 : 217-25.

At the Bambey Research Station, Senegal, cytological studies of the root-tip cells of *A. hypogaea* f. *macrocarpa* and eleven cultivated varieties from Africa and America showed  $2n = 40$  in all cases. Numerous univalents and multivalents were observed during meiosis in *A. hypogaea* f. *macrocarpa*, together with chromatin bridges and lagging chromosomes. Meiosis was regular in all the eleven cultivated varieties. Reasons put forward by other authors for assuming that *A. hypogaea* is an allopolyploid rather than an autopolyploid are discussed and species that may have been involved in its parentage are listed.

3387 NUCHOWICZ, A.

Recherches sur la culture d'embryons et de fragments d'embryons d'*Arachis hypogaea* L. I. Essais orientatifs. (Investigations on the cultivation of embryos and embryo fragments of *A. hypogaea* L. I. Preliminary experiments).

Agricultura, Louvain 1955 : 3 : 3-37.

Excised embryos from which the cotyledons had been removed were successfully cultivated *in vitro*. By dividing the embryo lengthwise into equal parts it was possible to obtain two seedlings.

3388 KING, F. P.

Wild peanuts make their bid in the peanut belt as forage crop.

Sth. Seedsman 1954 : 17 : No. 11 : p. 62.

The wild perennial species *Arachis prostrata* and *A. marginata* from South America proved to be well adapted, hardy and disease-resistant when tested for forage value at the Georgia Coastal Plain Experimental Station, Tifton, Ga. They produce little seed and are propagated vegetatively.

- 3389 **Annual Report of the Coconut Research Scheme, Ceylon, for 1950 (1952) : Pp. 43.**

**Annual Report of the Coconut Research Board of the Coconut Research Institute, Ceylon, for 1951 (1953) : Pp. 22.**

**Annual Report of the Coconut Research Board of the Coconut Research Institute, Ceylon, for 1952 (1954) : Pp. 44.**

Further work was carried out on the following: selection of mother palms; testing of  $F_1$  and  $F_2$  progenies of mother palms; intervarietal hybrid trials; and investigation of the value of selection of seedlings from high and low yielding palms and from heap nuts.

- 3390 TAMMES, P. L. M.

**Review of coconut selection in Indonesia.**

Euphytica, Wageningen 1955 : 4 : 17-24.

Most of the work surveyed in this article has already been summarized from an earlier review (cf. *PBA*, Vol. XX, Abst. 1142). In addition, it is noted that the Takome coconut, which bears large numbers of small fruits, is undergoing trial and that attempts are being made to obtain stable hybrids combining the desirable characters of ordinary coconuts with the earliness of dwarf varieties.

- 3391 MORETTINI, A.

Mutazioni gemmarie nell'olivo e loro applicazione per il miglioramento della coltura. (**Bud mutations in the olive and their utilization in improving the crop**).

Ital. agric. 1955 : 92 : 197-204.

The discovery of two bud mutations affecting leaf shape but not the fruit in Italian olive trees is reported. The author suggests that this opens up the possibility of improving the olive by clonal selection of productive trees raised from somatic variations. The identification of desirable sports in cultivated species and varieties and the elaboration of methods of inducing such variations artificially by X rays or colchicine should be encouraged.

- 3392 BREVIGLIERI, N. & BATTAGLIA, E.

Ricerche cariologiche in *Olea europaea* L. (**Caryological studies on *O. europaea* L.**).

Caryologia 1954 : 6 : 271-83.

The somatic number of chromosomes of  $2n = 46$

according to Taylor (cf. *PBA*, Vol. XVI, Abst. 1169) is confirmed. Their morphological configuration is also described and discussed with reference to (1) possible views on the phylogeny of the cultivated olive and the problem of speciation within the genus; and (2) the possibility of producing *gigas* types artificially, e.g. by colchicine treatment.

- 3393 SCARAMUZZI, F. & CANCELLIERI, M. B.

Contributo allo studio delle razze d'olivo coltivate in Toscana. Indagini condotte in provincia di Livorno e nella media valle del Cecina. (**Research on the varieties of olive cultivated in Tuscany. Investigations in the province of Livorno and in the central valley of the Cecina**).

Ann. Sper. agr. 1955 : 9 : No. 3 : Suppl. : lxxvii-cxix.

Further descriptions (cf. *PBA*, Vol. XXIV, Abst. 1432) are given of 33 olive varieties cultivated in the province of Leghorn; details are given concerning their distribution, synonyms and homonyms; references to some of the varieties in early literature are cited. Observations have been made on the floral biology of the varieties and data are presented on the time of flowering, percentage of floral abortion under conditions of open pollination and self and cross compatibility. All varieties produced some viable pollen, though the amount varied according to the variety; 29 proved to all intents and purposes self incompatible and the most suitable pollinators for each are indicated. Frantoio and Razzo are self compatible but gave better sets when cross pollinated.

- 3394 FRANCESCONI, F.

L'olivo e i mezzi di resistenza al freddo. (**The olive and its mode of resistance to cold**).

Ann. Sper. agr. 1955 : 9 : 301-19.

Observations on the sugar concentrations in the leaves of olive trees in Umbria during the winter of 1951-54 showed that transformation of insoluble carbohydrate into a soluble form is an important factor in the defence mechanism of the olive against frost (cf. Abst. 2357). This should be noted in the selection of mother trees for establishing clones in Italy with a wider range of adaptation than at the present time.

- 3395 WHITMAN, W. F.

**Tropical pomology as a hobby.**

Proc. Fla. hort. Soc. 1954 : 67 : 236-41.

Descriptions are given of some improved strains



of *Melicocca bijuga*, *Chrysophyllum cainito* and *Euphoria longana* which are being propagated in Florida. The need for further work on the improvement of tropical fruits adapted to the area is stressed.

- 3396 AROSTEGUI, F., ASENJO, C. F., MUNIZ, A. I. & ALEMANY, L.  
**Studies on the West Indian cherry, *Malpighia punicifolia* L.; observation and data on a promising selection.**  
 Proc. Fla. hort. Soc. 1954 : 67 : 250-55.

B-17, a promising selection under investigation at the Agricultural Experiment Station, University of Puerto Rico, bears fruits weighing 9-12 g. each and containing 1325-2250 mg. per 100 cc. of vitamin C.

- 3397 HOROVITZ, S.  
 Expresión sexual y sustancias florígenas en *Carica papaya* L. (**Sexual expression and flower-producing substances in *C. papaya* in Venezuela**).  
 Agron. trop., Venezuela 1954 : 4 : 13-27.

The sex relationships in papaya seem to be entirely controlled by the gene pair *Ff*, the various intermediate grades being caused by small chromosome duplications involving segments carrying these genes (cf. Abst. 2358). The intermediate forms are also more variable in the type of flower they produce, which depends largely on temperature but is influenced also by certain other environmental factors. This variation occurs only in genotypes which carry the gene *F* in some form or other, those with only *f* bearing exclusively female flowers. A hypothesis is presented according to which *f* is responsible for the production of an enzyme which converts a substrate referred to as proto-florine into a substance gynogenine, which conditions femininity; *F* produces an enzyme that converts gynogenine into another substance androgenine, conditioning masculinity; the second of these two enzymes is more sensitive to temperature and requires more energy for activation, since the flowers in the tip of the inflorescence show a greater tendency towards femininity than those lower down.

- 3398 CHATEAU, R.  
 Notes sur le genre *Carica* L. (**Notes on the genus *Carica* L.**).  
 Bull. agric. Congo belge 1955 : 46 : 261-70.

Brief botanical descriptions of the different species of the genus *Carica* are provided, together with synonyms and information on ecological distribution.

- 3399 HARDING, P. L.  
**The relation of maturity to quality in Florida avocados.**

Proc. Fla. hort. Soc. 1954 : 67 : 276-80.  
 Data are given on the ripening season and keeping quality of 16 commercial varieties.

- 3400 BAGENAL, N. B.  
**History and development of the cultivated fruits (Part VI).**  
 Rev. Ass. Agric., Lond. 1955 : No. 27 : 9-20.

Part VI of this series (cf. *PBA*, Vol. XXIV, Abst. 2379 and Vol. XXV, Abst. 2315) presents an historical account of the cultivation in England of strawberries, gooseberries, currants, raspberries and other soft fruits. The more important varieties are mentioned briefly.

- 3401 **First Annual Report of the Scottish Horticultural Research Institute, 1953-1954 (1954) : Pp. 28.**

**Raspberry.** Malling Promise, Malling Exploit and Norfolk Giant proved to be more resistant than Malling Jewel or Lloyd George to vein-banding virus.

It has been found that seeds of *Rubus idaeus* will not germinate unless stored for 4-6 weeks at 25° C., followed by 7-8 weeks at 0° C. Percentage germination is increased by soaking the freshly harvested seeds for 4 days in 1% calcium hypochlorite solution. Ten crosses have been effected among varieties and seedlings of red raspberry with the aim of combining high yielding capacity with improved quality and suitability for processing. A collection of *Rubus* species is being established.

**Strawberry.** Investigations have shown that the cycle of flower initiation and development of Climax is intermediate in character between that of spring-flowering varieties and that of the so-called perpetuals. Climax appears to be less influenced by day length than other varieties. An improved method of testing seedlings for resistance to red core has been devised; the technique involves growing the plants in a greenhouse instead of in the field. Breeding for resistance to red core is in progress and a number of species and subspecies are under investigation with a view to identifying sources of resistant material.

**Vegetables.** Preliminary crosses have been effected in Brussels sprouts and winter cabbage, the breeding objectives in the former crop being increased hardiness, earlier maturity, a deeper green colour and greater resistance to being blown over by wind, and in the latter crop the

production of strains with more reliable heading performances.

3402 HALL, J. W.

**Scottish fruit trials. First progress report.**

Scot. Agric. 1955 : 34 : 222-24.

Particulars of flowering time, maturity period, yield, incidence of disease and suitability for processing are given for 6 raspberry; 17 black-currant and 2 strawberry varieties under trial in Scotland since 1951.

3403 BERGER, X.

Untersuchungen über die Embryologie partiell apomiktischer *Rubus*-bastarde. (Investigations on the embryology of partially apomictic *Rubus* hybrids). Ber. schweiz. bot. Ges. 1953 : 63 : 224-66.

The following chromosome numbers were determined in species and hybrids of the section *Moriferi*: *R. rudis*, *R. procerus*, *R. 'Theodor Reimers'* (a cultivated form of unknown origin), *R. caesi*us x *R. 'Theodor Reimers'* and *R. caesi*us x *R. procerus*,  $2n = 28$  (tetraploid); *R. caesi*us x *R. tomentosus*,  $2n = 21$ ; and *R. caesi*us x *R. rudis*,  $2n = 42$ .

The embryo-sac development of the above hybrids and their parents and of the additional species *R. mercieri* is described in detail. Reduction divisions in the archesporium resulting finally in the formation of embryo-sac cells occur in all the material investigated, with the exception of *R. caesi*us x *R. procerus*, in which meiosis does not reach completion. Embryo-sac cells are also formed by mitotic division from both archesporial and somatic chalazal cells, apospory being more frequent in the hybrids than in their parents. From genetical studies it is concluded that the expression of the tendency to reproduce sexually, by apospory or by diplospory, appears to be intermediately inherited. In all the apomictic forms examined, except *R. procerus* and the completely diplosporous species *R. caesi*us, structures resembling embryo sacs were occasionally formed from binucleate tapetal cells of the anther and in some cases developed into eight-celled embryo sacs. Such modifications were not observed in the sexually reproducing diploid species *R. tomentosus* and *R. idaeus*. In emasculated, unpollinated flowers the occurrence of pseudogamy in the genus was indicated by the fact that in emasculated, unpollinated flowers, fusion of the polar nuclei to form a secondary embryo-sac nucleus did not take place and egg cell development was suppressed.

3404 JINNO, T.

(The geographical distribution of polyploid *Rubus* plants. II. On the vertical distribution).

Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 144-49. [Japanese].

The altitudinal range of 14 species was investigated in six mountains (1000-2000 m.) in Ehime prefecture. The diploids ranged to 1930 m.; polyploids were not found above 850 m., except *R. pectinellus* which attained 1250 m. The greater altitudinal range of the diploids may be associated with the fact that many of them produce winter buds.

3405 LANTZ, H. L. & DENISEN, E. L.

**Black Hawk, a new raspberry.**

Fruit Var. hort. Dig. 1954 : 9 : 59-60.

A description of this variety has been summarized from another source (cf. Abst. 2361).

3406 HASKELL, G.

**Genic and environmental relations of flowering-time in raspberry.**

Genetica 1955 : 27 : 377-90.

Flowering time in *Rubus idaeus* is affected by temperature and amount of sunshine, and the fact that the homozygous recessives for sepaloïdy (*d*) and those for yellow leaves (*g*) flower earlier than their respective dominants indicates that flowering time is affected either directly by these genes or by other closely linked genes. Late flowering is associated in only a few cases with the gene *t* for yellow fruits and green spines, suggesting that this gene does not itself affect flowering time but may be linked with one that does. Other morphological characters investigated appear to be unrelated to time of flowering. The  $F_1$  of *R. occidentalis* x *R. idaeus* flowers earlier than either parent selfed; out-crossed or sib-mated families of *R. idaeus* exhibit a similar heterotic effect in flowering earlier than selfed families. The paper concludes with a review of literature on the genetical control of flowering and stresses the need for further work on the subject.

3407 KRONENBERG, H. G.

Nachtvorstschade aan zwarte bessen-rassen in 1954. (Damage from night frost to blackcurrant varieties in 1954).

Fruittelt 1955 : 45 : 400-01.

The results of trials at Elst, Netherlands, on varietal differences in susceptibility to frost tallied closely with the results of similar trials conducted at the East Malling Research Station, England, in 1951-2 (cf. *PBA*, Vol. XXIII, Abst. 2923), Seabrook's Black and Goliath



suffering comparatively little damage. In addition, the Canadian varieties Crusader, Coronet and Consort and the Finnish variety Brödtorp proved comparatively resistant.

3408 DARROW, G. M.

**The new blueberry varieties.**

Amer. Fruit Gr. 1955 : 75 : No. 4 : 36, 38.

Information is given showing the superiority of the blueberries Earliblue, Ivanhoe, Bluecrop, Berkeley, Herbert and Coville over the older varieties for cultivation in the northern region of the USA.

3409 **Blueberries grow up.**

Agric. Res., Wash. 1955 : 3 : No. 9 : p. 6.

In work carried out by the United States Department of Agriculture, the hexaploid species *Vaccinium ashei* has been crossed with the diploids *V. tenellum*, *V. darrowii* and *V. elliottii* to produce tetraploid hybrids combining the vigour, earliness and drought resistance of the first species with the productivity, disease resistance and fruit qualities of the other three. Other species of possible breeding value are *V. myrsinites*, an evergreen with a brief dormancy period and very high tolerance of heat, and *V. membranaceum*, a late species with large, highly-flavoured fruits and high drought resistance.

3410 HAGERUP, O.

**Autogamy in some drooping Bicornes flowers.**

Bot. Tidsskr. 1954 : 51 : 103-16.

Descriptions are given of the autogamous mechanisms by means of which pollination is effected in the absence of insects in *Vaccinium uliginosum*, *V. myrtillus*, *Oxycoccus palustris* and various arctic members of the Ericaceae and Pyrolaceae.

3411 **How to select new strawberry varieties.**

Amer. Fruit Gr. 1955 : 75 : No. 4 : 46-47, 60.

The advantages of the new strawberry varieties Empire, Eden, Plentiful, Fla. 90, Albritton, Dixieland, Pocahonta and Stelemaster, introduced in the USA during the past four years, are described.

3412 SCOTT, D. H.

**The strawberry variety situation in eastern United States.**

Fruit Var. hort. Dig. 1954 : 9 : 53-56.

Brief descriptions and notes on the regional adaptation are given for the following varieties released in the USA during the past four years: Empire, Eden, Plentiful, Florida-90, Albritton, Dixieland, Pocahonta, Stelemaster, Armored and

Vermilion. The older varieties Blakemore, Howard 17 and Dunlap appear to be moderately tolerant of virus infection.

3413 SCOTT, D. H.

**Breeding work with strawberries, blueberries, and blackberries in eastern United States.**

Proc. Ohio hort. Soc. 1954 : 107 : 155-65.

Early and more recent breeding work on the strawberry and blueberry is surveyed, information being given on varieties released in the last few years.

Mention is made of the recently developed strawberry seedling US-3563 (*Fragaria virginiana* x Midland) which shows particular promise as a parent in breeding for blossom hardiness.

Breeding work on thornless blackberries is briefly described. Promising F<sub>2</sub> and back-cross seedlings have been developed from crosses of Merton Thornless with Eldorado and Brainerd.

3414 KRONENBERG, H. G. & WASSENAAR, L. M. **Practijkproeven met aardbeirassen 1952-1954. (Practical trials of strawberry varieties, 1952-54).**

Meded. Inst. Vered. TuinbGewass. 1955 : No. 63 : Pp. 27.

The results of trials conducted at seven centres in the Netherlands under theegis of the Institute for the Breeding of Horticultural Crops, Wageningen, are presented in the form of tabulated data on yield, maturity, plant vigour, appearance and flavour of the fruit and resistance to frost and diseases. Senga 54, Senga 188, Ydun and the Wageningen selection 667 gave the highest yields; Oberschlesien [Upper Silesia], Bowa, Senga 188, Senga 146 and Climax produced the largest berries. From the point of view of flavour, Deutsch Evern, Bowa, Climax and Senga 242 were adjudged superior. Bowa, Climax, Deutsch Evern, Senga 145 and Ydun were comparatively resistant to *Verticillium* wilt. Regina proved highly resistant to virus degeneration. Senga 242 and Jucunda were resistant to *Botrytis cinerea*; Ydun proved highly susceptible.

3415 REID, R. D.

**Breeding new strawberry varieties.**

Worcs. agric. quart. Chron. 1955 : 23 : 101-15.

The problems of breeding strawberries in Britain are discussed chiefly with reference to resistance to red core, virus diseases and June yellows. The initial success of the red-core resistant variety Climax was recently brought to an end as the result of attack by June yellows, a condition believed to be genetic in origin but whose

expression is highly variable and capable of remaining latent for a considerable number of years; probably the tendency to develop June yellows is fairly widespread among varieties. It is suggested that the industry should make use of several varieties instead of relying chiefly on one, as in the case of Climax. Some of the problems entailed in testing and selection are also considered.

- 3416 DARROW, G. M.  
**Leaf variegation in strawberry—a review.**  
Plant Dis. Reprtr. 1955 : 39 : 363-70.  
(Mimeographed).

Literature on the occurrence of variegation in the USA and Britain and on the inheritance of this disturbance is surveyed. In the author's view the evidence so far obtained suggests that variegation is due to a frequently mutating gene and is a recessive condition, more than one gene for variegation occurring among different varieties.

- 3417 WILLIAMS, H.  
**June yellows: a genetic disease of the strawberry.**  
J. Genet. 1955 : 53 : 232-43.

Data from crosses involving a nonsusceptible seedling variety and yellow and green plants of the susceptible strawberries Blakemore and Howard 17 have provided evidence that the change from green to June-yellows variegation is heritable. It is postulated that the disease is caused either by a high concentration of a rogue plasmagene or by a low concentration of a normal plasmagene necessary for chlorophyll production. Use of nonsusceptible varieties offers the only complete means of control but in some susceptible varieties partial control may be achieved by selection of stocks with a low incidence of yellowing.

- 3418 **New variety of strawberry for Maryland's east shore.**

Sth. Seedsman 1955 : 18 : No. 1 : p. 72.  
Stelemaster, a variety resistant to all races of red stele in the eastern USA, has been released to growers in eastern Maryland.

- 3419 McWHIRTER, K. G.  
**"June yellows": a cytoplasmic mutation in the cultivated strawberry.**  
Heredity 1955 : 9 : 151-52. (Abst.).

From experiments at the Department of Zoology, University Museum, Oxford, England, evidence has been obtained that the condition

of June yellows is the result of cytoplasmic mutation. Analogies are drawn between certain characteristics of June yellows and neoplastic behaviour.

- 3420 VENKATARAMANI, K. S.  
**The banana complex.**  
J. Indian bot. Soc. 1955 : 34 : 79-84.

Some of the literature on the classification of edible varieties of *Musa* is examined. It is concluded that the grouping of all varieties into a single species, as proposed by some authors, is not desirable, in view of the evidence of the diverse origin of the banana.

- 3421 HINRICHS, H. A.  
**A summary of grape variety trials in Oklahoma.**  
Bull. Okla. agric. Exp. Sta. 1955 : No. B-448 : Pp. 19.

Information is given on the performance of 118 varieties, including 43 French-American hybrids. Descriptive notes on the 58 varieties showing most promise are provided; of these 21 are suitable for growing commercially in Oklahoma.

- 3422 VEGA, J.  
Estado actual de la defensa contra la filoxera en Francia. (**Present state of the control of phylloxera in France**).  
Idia 1954 : No. 82 : 21-28.

This review contains a section on breeding, reference being made to the work of clonal selection in vines and rootstocks and to the probability that measures will soon be taken in France to prohibit the use of direct-producer hybrids. Mildew-resistant hybrids are now also available.

- 3423 DAVITAJA, F. F.  
**(The role of environment in form development in vines and the principles of the classification of varieties).**  
Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Genet. Pl.-Breed.) 1950 : 28 : No. 3 : 128-50. [Russian].

The merits of various classifications of vines are discussed and it is pointed out that the order in which some varieties ripen may change from one area to another. A reliable criterion for classification was found to be the sum of temperatures required by a variety to reach fruit maturity, on the basis of which five main groups are established, with intervals of 400° C. between them; some will ripen with 2100° while others require up to 10,000°; subgroups



are made according to the degree to which the autumn wood reaches maturity. Other features taken into consideration are tolerance of drought, excess moisture, shade or frost, the capacity to produce fruit from latent buds and the quality of the grapes for different types of utilization.

The great variation between varieties in respect of heat requirements and the relatively slight variation in respect of reaction to frost, light, temperature required for initiation of growth and moisture requirements is explained on Darwinian grounds: areas in which vines grow are much less diverse in respect of the latter group of features and natural selection has not therefore been operative; even as regards frost it has been largely cut out through the practice of covering the vines in winter.

With a knowledge of the temperature requirements of vines based on the present classification it has been possible to make successful recommendations of varieties for growing in new areas and to extend the period of production of fresh grapes in the USSR from one month to over three.

3424 BURIĆ, D.

Vrednosti nekih manje poznatih sorata vinove loze. (**The value of some little-known varieties of vines**).

Arh. poljopr. Nauk 1954 : 7 : 22-41.

A few introductions from Hungary, some being hybrids of recent origin, are described. They include some fine dessert varieties and a good wine variety, all distinguished by pleasant muscat flavour.

3425 GOLLMICK, F.

Untersuchungen über die Blattbräune (Melanose) der Reben. [**Investigations on brown leaf (melanosis) of vines**]. Phytopath. Z. 1955 : 23 : 249-322.

A distinction is made between "true melanosis," caused by *Septoria ampelina* and "false melanosis," a physiological disorder due to nutritional disturbances. The symptoms are identical and consist of necrotic spots that later develop into brown dead patches on the leaves. The present investigations, conducted at the Nauburg Institute of Phytopathology, Eastern Germany, were concerned primarily with false melanosis and showed that soil and climatic conditions played a considerable role in the incidence of the disorder. Some varieties were considerably less susceptible than others and it is thought that breeding for complete immunity should prove feasible.

3426 MELJNIK, N. M.

(**A viticultural state farm in White Russia**).

Vinodelie Vinogradarstvo SSSR (Wine-mak. & Vitic. USSR) 1955 : No. 3 : 52-54. [Russian].

Madeleine Angevine was outstanding in yield among the European vines tested in the Brest province. Far Eastern strains such as Alpha and hybrids between *Vitis amurensis* and *V. labrusca* proved adapted to the climatic and soil conditions and showed resistance to mildew.

3427 KOSTIK, F. D.

(**Development of phylloxera upon the leaves of European vine varieties**).

Agrobiologija (Agrobiology) 1955 : No. 2 : 120-24. [Russian].

Under outdoor conditions the larvae were unable to feed on the leaves of *Vitis cinerea*, *Parthenocissus quinquefolia* and *Rupestris* du Lot, although no toxic effects on the insects were observed. On the leaves of the European varieties Aligoté and Galjbena the larvae lived for 14 days but then most of them died. They were able to live and lay eggs on Black Gamay, Korna Njagra and White Chasselas, although their vitality was reduced and hardly any insects survived in the second generation.

## FORESTRY

Huitième Congrès International de Botanique, Paris 1954. Rapports et communications parvenus avant le congrès à la section 13. (**Eighth International Botanical Congress, Paris 1954. Reports and communications presented to the Congress in section 13**). Pp. 152.

Section 13 of the above report deals with forestry and includes the following articles of interest to breeders:—

3428 Syrach Larsen, C. *Forestry and genetics*. (pp. 1-9).

The application of genetics to forest tree breeding is discussed and progress achieved in Denmark and elsewhere since the turn of the century is outlined. Special mention is made of the importance of cooperation between geneticist, zoologist and pathologist in developing material resistant to insect pests and diseases.

3429 Houtzagers, G. *Application of genetics in forestry and reafforestation*. (pp. 10-12).

Measures undertaken in the Netherlands during the past two years to promote the setting up of seed nurseries are outlined. Selection, hybridization, the exploitation of heterosis, the

vegetative propagation of plus trees and crosses effected between the Japanese and the European larch also receive attention. Mention is made of a Netherlands mission that brought back from the USA selected seed of Douglas fir, *Abies grandis*, *Thuja plicata* and *Tsuga heterophylla*. Trees from this seed have adapted themselves well to Netherlands conditions.

- 3430 Pauley, S. S. *The photoperiodic response and its importance in tree improvement.* (pp. 13-16).

The importance of photoperiodic response in forest trees is indicated. The physiological factors controlling frost resistance do not begin to function until annual growth ceases and, as time of cessation of growth is determined largely by response to day length, natural selection of genotypes suitable for any given latitude automatically takes place. The importance of photoperiodic influences on breeding work and on the introduction of tree species is then discussed with special reference to *Populus trichocarpa*.

- 3431 Wettstein-Westersheim, W. & Grüll, H. *Das photoperiodische Verhalten von Kiefernherkünften* (Pinus silvestris L.). [Photoperiodic behaviour of pine provenances (P. silvestris. L.)]. (pp. 17-19).

Selection of trees suitable for cultivation in the Austrian Alps at altitudes of over 1000 m. is described. Specimens taken from altitudes of between 250 and 1000 m. were divisible into short-day and long-day types, as shown by exposure to short photoperiods. Trees with long-day requirements were adapted to the higher altitudes. Their rate of growth and dry-matter content were less than those of short-day plants under both long-day and short-day conditions.

- 3432 Langlet, O. *Importance d'une spécification rigoureuse de l'origine des semences.* (Importance of an exact specification of the origin of seed stock). (pp. 19-22).

It is pointed out that considerable differences exist in Sweden between forest-tree seeds of varying provenance. It is therefore essential that the origin of the seed should be specified. Regulations in force in Sweden to this end are outlined.

- 3433 Schulenburg, A. *Fr. v. d. Probleme um Provenienzfragen bei Vorwaldholzarten für die Neubewaldung von Ödlandsböden.* (Problems concerning questions of provenance in perimeter forest-tree species for the reafforestation of wasted soils). (pp. 22-23).

In experiments on arid, sandy soils southeast of

Berlin, *Betula verrucosa* of Brandenburg provenance proved suitable for soil reclamation. A race of the same species from Holstein proved insufficiently resistant to drought.

- 3434 Riker, A. J. & Patton, R. F. *Breeding of Pinus strobus for quality and resistance to blister rust.* (pp. 23-24).

Breeding for resistance to *Cronartium ribicola* at the University of Wisconsin is outlined. Susceptibility appears to be dominant to resistance. Selection, intraspecific and interspecific hybridization and vegetative multiplication of resistant trees have all given promising results.

- 3435 Seitz, F. W. *Die Bewertung eines Norm-Abweichers aus der Graupappel-Mannigfaltigkeit als Züchtungsmittel.* (The evaluation of a form deviating from the norm of the grey poplar complex as breeding material). (pp. 28-29).

The potential value for breeding purposes of triploid forms discovered among the progeny of the Dillingen hermaphrodite poplar clone is indicated (cf. PBA, Vol. XXIV, Abst. 2468).

- 3436 Schmidt, W. *Physiologische Tests im Keimlingsalter.* (Psychological tests at the seedling stage). (pp. 29-30).

Brief mention is made of physiological tests designed to measure the potential vigour and rate of growth of trees while still in the seedling stage, thus accelerating breeding work.

- 3437 MUHAMMED IHSAN-UR-REHMAN KHAN  
**Forest tree breeding.**

Pakist. J. For. 1954 : 4 : 252-60.

Methods of forest improvement such as selection and breeding of local material, introduction of exotic species and exploitation of heterosis and polyploidy are described briefly, examples being given of results that have been obtained by workers in European and other countries. The desirability of employing such methods in Pakistan is stressed.

- 3438 JOHNSON, H.  
Från Foreningens för växtförädling av skogsträd verksamhet. (On the work of the Association for Forest Tree Breeding).

Svensk PappTidn. 1955 : No. 5 : 165-74.

The work accomplished by the Swedish Association for Forest Tree Breeding at its three stations at Ekebo, Brunsberg and Sundbo since 1936 is surveyed and current breeding methods in pine, spruce, larch, birch, aspen, alder and other deciduous tree species are described (cf. PBA, Vol. XXIII, Abst. 677, Vol. XXIV, Abst. 654 and Vol. XXV, Abst. 1432). A list of the



literature published since 1938 under the auspices of the Association is appended.

3439 PERRY, T. O.

**A grafting technique for forest genetics research.**

J. For. 1955 : 53 : p. 33.

The method described is employed at the University of Florida, USA, and enables a greater percentage of successful grafts to be made than is normally the case with pine and certain other trees. It has proved of great value in experiments involving controlled pollinations as, by grafting the desired genetic material on to short stocks, the need for a ladder is obviated.

3440 HEIMBURGER, C. & HOLST, M.

**Notes from a trip to the southern United States, January, 1953.**

For. Chron. 1955 : 31 : 60-73.

The authors give an account of the observations they made on red spruce, Norway spruce, white pine and several other tree species during their visit, the main purpose of which was to collect material showing promise for direct use or breeding in Canada. The possible breeding value of some of the collection is discussed.

3441 **(A conference dealing with protective forest belts).**

Les. Hoz. (Forestry) 1955 : No. 3 : 37-51. [Russian].

A report by V. Ja. Koldanov formed the basis for a discussion organized by the USSR Ministry of Agriculture in November 1954. This stated that Lysenko's method of sowing trees in clusters was one of the main causes for failures in forestry work. Some speakers who followed Koldanov shared his viewpoint, but others reported good growth and development of trees sown by the method. Lysenko expounded his theory of the absence of intraspecific competition.

3442 CHISMAN, H. H.

**Fernalds oak.**

J. For. 1955 : 53 : p. 454.

The discovery of a natural hybrid between *Q. rubra* and *Q. ilicifolia* (*Q. fernaldi*) is reported from central Pennsylvania. In growth habit and morphology of the leaves, the hybrid resembled *Q. ilicifolia*. The acorns it produced were, however, like those of *Q. rubra*.

3443 PAULEY, S. S.

**Variation in time of break of dormancy among altitudinal ecotypes of *Populus trichocarpa*.**

Genetics 1954 : 39 : 986-87. (Abst.).

A study of altitudinal ecotypes of *P. trichocarpa* grown under uniform conditions of temperature

and day-length during the spring of 1953 indicated that types with a long growing season from low elevations were significantly more precocious than forms with a short growing season from high elevations. This observation was unexpected since it had been thought that high-elevation ecotypes would display a precocity similar to that characterizing the behaviour of related forms from high latitudes.

3444 SCHAFFALITZKY DE MUCKADELL, M.

**A development stage in *Fagus sylvatica* characterized by abundant flowering.**

Plant Physiol. 1955 : 8 : 370-73.

In artificial pollination experiments, grafts of *F. sylvatica* rarely produce flowers. At the Hørsholm Arboretum, Denmark, grafts flowering abundantly have been obtained by using as rootstock horizontal branches which were growing on an isolated 50-year-old tree and which faced south-west. No flowers were obtained from scions on young stocks.

3445 CRAM, W. H.

**Self-compatibility of *Caragana arborescens* Lam.**

Canad. J. Bot. 1955 : 33 : 149-55.

Observations on 218 selections of *C. arborescens* at the Forest Nursery Station, Indian Head, Sask., showed a continuous variation, ranging from 0.0 to 99.5%, in the fruit set on selfing, the majority of the plants tending to be self incompatible. A slightly higher degree of incompatibility was found among trees selected for vigour. Pollen abortion, which ranged from 0 to 24%, had little or no influence on self compatibility. The degrees of cross compatibility shown by one self-compatible and three self-incompatible selections could be explained as the result of the action of three allelomorphous factors, designated  $S_1$ ,  $S_2$  and  $S_3$ .

3446 PRYOR, L. D.

**An  $F_1$  hybrid between *Eucalyptus cinerea* F. Muell. and *Eucalyptus robusta* Sm.**

Proc. Linn. Soc. NSW 1954 : 79 : 196-98.

Several  $F_1$  hybrids were obtained from a cross between *E. cinerea*, which belongs to the section *Macrantherae-Normales*, and *E. robusta*, belonging to the section *Transversae*. The hybrids were taller than either parent and were intermediate in many morphological juvenile characters between the parental forms.

3447 PRYOR, L. D.

**The inheritance of inflorescence characters in *Eucalyptus*.**

Proc. Linn. Soc. NSW 1954 : 79 : 79-89.

The basic morphological features of *Eucalyptus*

inflorescences are discussed with reference to the literature. Crosses of species possessing three-flowered inflorescences with species that have seven-flowered inflorescences showed the latter character to be partly dominant over the former. In a few cases, especially in  $F_1$  hybrids bearing a strong morphological resemblance to the three-flowered form, an irregular number of flowers, intermediate between three and seven, was found.  $F_1$  hybrids with seven-flowered inflorescences occasionally bore a few three-flowered inflorescences.  $F_2$  segregates included a considerable proportion of plants with 4-6 flowered inflorescences and many instances of isolated three-flowered clusters occurring on plants with predominantly seven-clustered inflorescences.

3448 BARBER, H. N.

**Adaptive gene substitutions in Tasmanian eucalypts: I. Genes controlling the development of glaucousness.**

Evolution, NY 1955 : 9 : 1-14.

Investigations were carried out on variation in the type of glaucousness resulting from deposition of wax on the epidermis. The melting point of the wax varies according to the taxonomic series. Intraspecific variation in glaucousness is either clinal, or sporadic and the result of mutation and hybridization. Clines are associated with frost activity, the more glaucous populations occurring in the more frosty localities. Parallel clinal variation was observed in eight species. A cline in glaucousness probably represents a change in the allelic frequencies at one or more loci controlling wax development. The selective factors creating and maintaining intraspecific and interspecific clines appear to be of the same order. Parallel variations in glaucousness are believed to be the result not of introgression but of independent adaptive processes stimulated by similar environmental stresses.

3449 CHAPMAN, E. F.

**Cyprus eucalypts. A report on the *Eucalyptus* species found growing in Cyprus 1953.**

Cyprus Gov. Print. Off., Nicosia 1954 : Pp. 56.

The 25 naturalized species and some of their hybrids and local varieties are described, a key to identification being provided. Hybrids of parentage thought to involve *E. cornuta* and one or both of the species *E. occidentalis* and *E. platypus* appear to be tolerant of saline con-

ditions, of poorly aerated soils and of exposure to wind.

3450 MATTHEWS, J. D.

**Japanese larches at Dunkeld, Perthshire. A study in variation.**

For. Rec. 1954 : No. 25 : Pp. 23.

Information is provided on the growth characteristics and variation in vegetative characters, flowering time and cone and seed characters of 11 Japanese larches, all of which are over 60 years of age and have been used as a source of seed of the Dunkeld hybrid larch, *Larix eurolepis*. Detailed descriptions of each individual tree are included.

3451 JOHNSON, H.

**Utvecklingen i 15-åriga försöksodlingar av tall i relation till proveniens och odlingsort. (The development of pine trees in 15-year old experimental plantations in relation to provenance and place of cultivation).**

Svenska SkogsvFören. Tidskr. 1955 : 53 : 56-88.

The plants used in these provenance trials were raised from seed obtained in 1937 from 19 localities throughout Sweden. In 1939 they were planted out at Boxholm, southern Sweden, at Dalfors, central Sweden and at Rörstrom, northern Sweden, and their height, diameter and volume measured at regular intervals. Trees of northern provenance had a shorter growing season and a slower rate of growth than those of southern origin, had thinner branches and were more resistant to frost and heavy snow falls. In general the transfer of seed from north to south resulted in a decrease in growth rate and the transfer of seed from south to north led, provided the distance involved was not too great, to an increase in the annual rate of growth. Trees of southern provenance planted at Rörstrom suffered from a high mortality rate as the result of frost and heavy snow falls; trees of northern provenance planted at Boxholm were often unable to compete with the surrounding vegetation and brush. It is concluded that, until day-neutral trees have been selected, it is inadvisable to plant seed obtained from trees situated more than 2° latitude from the intended place of cultivation.

3452 TURRILL, W. B.

***Abies Pinsapo* var. *vel hybrida*.**

Curtis's bot. Mag. 1955 : 170 : Part III : Tab. 242 : unpaginated.

A specimen intermediate between *A. pinsapo* and *A. numidica* is described. It was grown at



Kells, Co. Meath, Ireland, having been obtained from James Veitch and Sons in 1912. It is thought that the tree might either be a hybrid between the two species or a natural variant intermediate between them. It is suggested that the two taxa might best be regarded as conspecific vicariants.

## VEGETABLES

### **Fifth Annual Report of the National Vegetable Research Station, Wellesbourne, Warwick 1954 (1955) : Pp. 73.**

3453 *Haigh, J. C. Plant breeding report. (pp. 11-15).*

**Beet.** The 245 varieties of red beet tested were classified into 8 major groups.

**Radish.** A study of varieties of the forcing type was initiated. On the basis of root shape and colour, 114 varieties were tentatively divided into 12 groups.

**Onion.** Male-sterile plants found in Cambridge 10 have indehiscent anthers; the inheritance of this defect, of possible value in hybrid production, is to be investigated.

**Asparagus.** Observations on a small number of  $4n$  plants suggested that it may be possible to obtain selections giving higher yields than  $2n$  asparagus.

**Cabbage.** A further trial was carried out to classify spring-cabbage varieties.

**Cauliflower.** For breeding purposes, propagation by stem cuttings has proved successful.

**Brussels sprouts.** Inbreeding has increased the tendency to bolt; elimination of this tendency by selection of nonbolters is to be attempted. The inheritance of the male sterility discovered in some inbreds is to be investigated with a view to the possibility of using this character in hybrid production. Crosses have been made between  $S_1$  plants of Cambridge Special to study the incompatibility system. No evidence has been obtained of mutation affecting the incompatibility system in X-irradiated material (cf. Abst. 1462). Interplanting of alternate rows of two varieties does not show promise as a commercial method of producing hybrid seed; no more than 50% crossing occurred in either direction and the yield of marketable sprouts from "hybrid" plots was not significantly greater than that of the better yielding parent. Investigations are to be carried out to elucidate the causes of the deterioration which may affect type and quality after only a few generations of seed multiplication.

**Lettuce.** The third trial of cabbage-lettuce varieties completed the exploratory stage of the breeding project. The 232 varieties studied

consisted of 81 Butterhead, 54 White Boston and 97 Curly types, divisible into 30, 9 and 21 groups respectively.

3454 *Watts, L. E. Synonymy in lettuce varieties. (pp. 16-36).*

As a result of observation trials carried out at the station during 1952-54, 232 varieties of cabbage lettuce grown in Britain, continental countries and the USA have been classified into 60 groups. Details of the methods and characters used and of each of the groups are given; an appendix provides an index of varietal names and their synonyms.

3455 *Nelder, J. A. Statistics report. (p. 64).* The experiments included a study of polygenic variation in varieties of French bean.

3456 **PHILIPP, F.**  
Ergebnisse der Treibgemüsesortenversuche 1954. (Im Rahmen der österr. Zuchtbuchkommission). [**Results of trials of vegetable varieties for forcing, 1954. (In connexion with the commission for the Austrian book of cultivated varieties)**].  
Mitt. Klosterneuburg 1955 : 5 : 57-75.

The results of trials of new varieties of kohlrabi, carrot, radish and lettuce suitable for early cultivation under glass are presented.

3457 **BANGA, O.**  
**The Institute of Horticultural Plant Breeding.**  
Euphytica, Wageningen 1955 : 4 : 7-14.

The organization of the Institute of Horticultural Plant Breeding, Wageningen, Netherlands, is outlined and the problems under investigation by individual workers in the various sections are noted.

3458 **CIFERRI, R.**  
Note sistematiche su alcuni ortaggi della Cina centro-meridionale. (**Systematic notes on some vegetables of central southern China**).  
Riv. Ortoflorofruttic. ital. 1955 : 39 : 13-20.

These notes were compiled during a visit by the author to the central southern region of China, especially the western part between Peking and Canton, where the climate ranges from warm temperature to subtropical.

With the aid of Chinese botanists and horticulturists, numerous vegetables and edible herbs that are eaten in China have been identified and described. Latin diagnoses are appended for 12 new taxa and some new combinations; these include species of *Allium*, *Benincasa*, *Brassica* and *Raphanus*.

**3459 Fire Dance and Gold Pak.**

Sth. Seedsman 1955 : 18 : No. 3 : p. 21.

Gold Pak, a new carrot developed in California, has short tops and long, smooth and slender roots of good quality and colour.

**3460 LEVITIN, A. N.**

**(Changing the heritable basis of the oriental radish).**

Agrobiologija (Agrobiology) 1955 : No. 1 : 116-20. [Russian].

Oriental forms of *Raphanus sativus* changed into bolters producing seed and underdeveloped roots when grown for a generation or so in the Ukraine. The development of this new form of radish is accounted for by the vernalization phase taking place in warm weather and by the shortened photoperiod. By sowing the bolter in late autumn or early spring, it was induced to revert to the original nonbolting form and produce normal roots.

**3461 BERTOSSI, F.**

Su di una "modificazione somatica" permanente provocata da diidrostreptomycina in un ceppo di tessuto di *Helianthus tuberosus*. **(On a permanent "somatic modification" induced by dihydrostreptomycin in a tissue culture of *H. tuberosus*.)**

Atti Ist. bot. Univ. Pavia 1954 : Ser. 5 : 10 : 225-29.

Incapacity to synthesize chlorophyll and slowing down of cell reproduction were induced by treating *H. tuberosus* tissue cultures with various concentrations of dihydrostreptomycin. These defects were retained in transplants of the tissue even when grown in a medium containing no dihydrostreptomycin.

**3462 JONES, H. A. & PERRY, B. A.**

**Get ready for the Eclipse.**

Sth. Seedsman 1954 : 17 : No. 9 : 20-21.

Developed at the Plant Industry Station, Beltsville, Md., from Crystal Wax x Excel back-crossed to Excel and then selfed, Eclipse is a high-yielding, mild-flavoured white onion with resistance to bolting, splitting and pink root (*Pyrenochaeta terrestris*).

**3463 BANGA, O.**

Uienveredeling met gebruikmaking van inteelt en herstel door heterosis. **(Improving onions by making use of inbreeding and restoration by heterosis).**

Meded. Dir. Tuinb. 1955 : 18 : 391-400.

The basic principles underlying the production of  $F_1$  hybrids displaying heterotic effects are outlined. The success of American breeders in

developing hybrid onions has encouraged similar experiments in the Netherlands and, with the aid of male-sterile lines, hybrids with considerably increased yields and of improved quality have been obtained. At the present time, emphasis is being laid on the production of high-yielding  $F_1$  hybrids, possessed of good keeping quality, that are not susceptible to damage during transportation.

**3464 FRANKLIN, D. F. & JONES, H. A.**

**B12115 : a superior new onion inbred for use as a pollen parent in hybridization.**

Circ. Idaho agric. Exp. Sta. 1953 : No. 125 : Pp. 4.

The late-flowering inbred B12115, developed at the University of Idaho Agricultural Experiment Station from a selection from Utah Sweet Spanish, has shown unusually good combining ability when used as a pollen parent with late-flowering male-sterile lines. The performance of many of the resulting hybrids has been very good. The bulbs are attractive in appearance and show a high degree of uniformity in colour, size and shape.

**3465 YAMAURA, A.**

**Genetical and cytological studies in *Allium*. II. Distribution of frequencies of chromosome number in pollen grains of  $F_1$  plant of *A. cepa* x *A. fistulosum*.**

Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 49-52.

A description of chromosome structure in the pollen of the above hybrid is given. The modal chromosome number in the pollen grains was  $n = 8$ , but in ca. 20% of the grains there were  $n = 9$  chromosomes.

**3466 KAZAKOVA, A. A.**

**[Biology of flowering and fertilization in onion (*Allium cepa* L.).]**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 97-102. [Russian].

A description is given of the onion inflorescence; the amount of seed set from self pollination varied from 0-3% in some varieties to 7-8% in others; somewhat higher sets were obtained when two inflorescences of the same plant were isolated in a single isolator, and when the two inflorescences were from different plants of the same variety the set varied from 5-10% in some varieties to 20-26% in others; from 2-3 inflorescences of different varieties isolated together sets of 8-10 to 25-37% were produced and from open pollination 30-80%.



Pollen taken from flowers in the bud did not germinate but quite viable pollen was obtained from unburst anthers of open flowers. Normal pollen lost its viability after two days under laboratory conditions and after three in a desiccator. Pollination of emasculated flowers after varying intervals showed that in northern varieties the stigma remained receptive for up to 10 days, in southern varieties for 6-7.

3467 KENNEDY, F. A.

**Twelve new hybrids indicate vigor of onion breeding program.**

Sth. Seedsman 1954 : 17 : No. 6 : 15, 53.

It is noted that 12 high-yielding  $F_1$  hybrid onions adapted to various parts of the USA have been produced by the US Department of Agriculture and a number of State experiment stations through the use of male-sterile material.

3468 ARASIMOVICH, V. V. & ISKOZ, B. M.

**(Dynamics of chemical composition in onion varieties).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 191-96. [Russian].

Analyses carried out on a large collection of onions showed that the sweet and semisweet varieties contained less sugar than the pungent varieties and a lower proportion of their sugars consisted of sucrose; they also had a lower total dry matter content.

Variations between plants of a given variety were detected in respect of dry matter and sugar content and there is thus scope for improvement by selection.

3469 YAMAURA, A.

**Genetical and cytological studies in *Allium*. III. Two genes in *A. fistulosum*.**

Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 85-86.

Two variant characteristics, nonwaxy epidermis and nonviable pale yellow seedling, are described. Each is determined by a single recessive gene, designated *nw* and *y*, respectively. The two genes are not linked.

3470 KADRY, A. EL R. & KAMEL, S. A.

**Cytological studies in the two tetraploid species *Allium kurrat* Schweinf. and *A. porrum* L. and their hybrid.**

Svensk bot. Tidskr. 1955 : 49 : 314-24.

Reciprocal crosses between *A. kurrat* and *A. porrum* gave rise to  $F_1$  hybrids with  $2n = 32$ , as in both parents. The chromosomes of both species could be classified into three groups according to the position of the centromere. The haploid set in each parent included two

chromosomes with satellites and two with secondary constrictions, the satellited chromosomes of *A. kurrat* being shorter than those of *A. porrum*. Laggards, chromatin bridges and micronuclei were noted in the parents and  $F_1$  hybrid. In approximately 70% of the pollen mother cells of the  $F_1$  hybrid, 16 bivalents were found. It is suggested that, although the two parents are differentiated chromosomally by structural modifications, they may be considered as a single species or as two closely related ones.

3471 DARLINGTON, C. D. & HAQUE, A.

**The timing of mitosis and meiosis in *Allium ascalonicum*: a problem of differentiation.**

Heredity 1955 : 9 : 117-27.

At the Botany Department, Oxford University, England, investigations were carried out on a clone of *A. ascalonicum* in which the pollen fails to develop. Central zones of cells were recognized in which premeiotic mitosis and meiosis were delayed relative to the main body of cells. Delayed prophase was associated with continued growth of the cells, chromosome breakage, and in the case of cells undergoing meiosis, asynapsis as the result of failure of chiasma formation; all the delayed meiotic cells displayed asynapsis but not all asynaptic cells contained breaks. Premeiotic and meiotic cells showing such abnormalities died. The unretarded development of cells in the peripheral zones of the anthers was characterized by three successive and apparently unrelated irregularities: (1) production of polyploid mother cells and pollen grains as the result of spindle failure, (2) formation of microsporocytes by nucleolar chromosomes, and (3) atrophy of all pollen grains after the first mitosis. Physiological aspects of such differentiation into two dyschronized groups of cells and also of the observed breakage-asynapsis syndrome are discussed.

3472 JENKINS, J. M. (JUN.)

**A new shallot, the Wilmington.**

Sth. Seedsman 1954 : 17 : No. 11 : 37, 111.

Wilmington, a vigorous seedling selection producing 8 to 15 white-skinned bulbs per clone, has been released by the North Carolina Agricultural Experiment Station. It appears to be free from any serious disease.

3473 BATEMAN, A. J.

**Self-incompatibility systems in angiosperms. III. Cruciferae.**

Heredity 1955 : 9 : 53-68.

The demonstration that self incompatibility in *Iberis amara* is determined by a multiple system of S alleles with sporophytic control of pollen

and style reaction led to a reexamination of published data on other members of the Cruciferae (cf. Abst. 1534). Analysis of the data on *Cardamine pratensis*, *Capsella grandiflora* and *Brassica oleracea* revealed that they were in accordance with the results obtained for *I. amara*. Unpublished data on *Raphanus sativus* and *Brassica campestris* indicated that the multiallelic system of incompatibility in these species is also under sporophytic control. It is concluded that self incompatibility throughout the Cruciferae is probably under sporophytic control. This conclusion is supported by the fact that in all the crucifers so far examined for pollen growth incompatible pollen is inhibited before the stigma has been penetrated. Artificial allotetraploids induced in *Brassica* and *Raphanus* are generally self sterile, as would be expected with sporophytic control. A survey of 182 species belonging to the Cruciferae showed that tribes and even genera tend to contain both inbreeding and outbreeding species; both these breeding habits appear to be necessary for the survival and evolution of a taxonomic group.

3474 Variedad del repollo "Sanare" obtenida por el MAC. (**Sanare, a cabbage variety produced by the Ministry of Agriculture**).

Agricultor venezol. 1954 : 19 : No. 172 : 31, 38.

The variety Wisconsin All Season, which is resistant to *Fusarium* yellows, was induced to flower in Venezuela by incision of the heads. The operation was repeated in a number of successive generations and a variety has now been obtained which is well adapted to the photoperiodic and other conditions of Venezuela and gives a high yield of heads of good quality.

3475 NAKAGAWA, H. & HENMI [HEMMI], S. — (**Studies on the effect of low temperature treatment on the production of seed of *Brassica pekinensis* in the autumn**).

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 161-63. [Japanese].

By growing at a temperature of ca. 0° C. for 32 days after germination, autumnal bolting was accelerated. This method of seed production should assist in shortening the breeding period of this crop.

3476 MACFARLANE, I.

**Variation in *Plasmodiophora brassicae* Woron.**

Ann. appl. Biol. 1955 : 43 : 297-306.

Three races of *P. brassicae*, designated A, R and V, have been distinguished by their capacity to produce clubbing in investigations at the

Rothamsted Experimental Station, Harpenden, England. Race R (stock culture) failed to club turnip and swede; the local races A and V from Norway were identified by their effects on different turnip and swede varieties. The three races, however, caused equal numbers of zoosporangial root-hair infections. Some partially resistant varieties became clubbed when spore concentrations were increased above the level necessary to produce complete infection of susceptible varieties. No relationship was found between susceptibility to clubbing and taxonomic position within the Cruciferae. In breeding for resistance, use of isolates of *P. brassicae* from as many sources as possible is recommended. The resistant Danish swede Wilhelmsburger was completely susceptible to race V.

3477 ZANOTTI, L.

Il cavolfiore tardivo di Fano in decisivo miglioramento genetico. (**The late-maturing cauliflower of Fano definitely improved genetically**).

G. Agric. Domen. 1955 : 65 : p. 153.

By careful selection from the types grown in this famous Italian centre of cauliflower growing, and by comparing the selections with the best varieties grown elsewhere, it has been possible to select a series of improved races, referred to as Fano-I-Z, Bondone-Z, Fano-II-Z, Roma-Z, Fano-III-Z and Tardivo-Z [Late-Z], which ripen successively from the middle of March to the third week in April. All resist the effects of frost, snow, sun and sudden temperature changes, are free from bolting, keep well in the field or in storage, are healthy and produce heads of good quality and flavour.

3478 SVENSSON, V.

Blomkålsförsöken på Weibullsholm 1954. (**Cauliflower trials at Weibullsholm, 1954**).

Weibulls Allehanda 1955 : 7-10.

The results of trials of Swedish and foreign varieties at Weibullsholm, Sweden, in 1954 are presented and data on maturity groups given. Stor Dansk OE/50 [Large Danish OE/50] and the late-maturing variety Erfurter AH4 gave the best results.

3479 ČEKRYGINA, A. A.

(**Introduce the best varieties**).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 8-9. [Russian].

**Cauliflower.** Otečestvennaja [Fatherland] and Moskovskaja Konservnaja [Moscow Processing], notable for their high yields and good quality heads have been developed. Otečestvennaja is tolerant of drought conditions.



**Cucumber.** Havskii 264 (Nerosimyĭ 40 [Rain-fed 40] x Berlizovskii) is late maturing and shows resistance to drought and diseases. Its yield is considerably higher than that of its female parent. Avant-garde 121, selected for earliness from a Far-Eastern form, outyields Vjaznikovskii 37 which is a standard for the Moscow province; it shows resistance to bacteria and mildew.

3480 RICK, C. M. & PERKINS, D. Y.

**Resistance to clubroot disease is goal of breeding project in Brussels sprouts.**

Calif. Agric. 1955 : 9 : No. 4 : 8-9, 10-11.

In a cooperative breeding project of the California Extension Service and the University of California Experiment Station, crosses between Brussels sprouts and a cabbage resistant to *Plasmiodiophora brassicae* gave resistant F<sub>1</sub> generations with intermediate morphological characters. In back crosses to Brussels sprouts resistance and morphological characters segregated independently. Further selection and breeding for resistant Brussels sprouts are now in progress and attempts are being made to transfer resistance to broccoli and cauliflower.

3481 AXELSSON, F.

Sallat Böttners driv/48. (**The lettuce Böttner's Forcing 48**).

Weibulls Allehanda 1955 : p. 18.

Böttners' Forcing 48 is a long-day variety suitable for cultivation under glass in early spring. A line selection from Böttners' driv Specialzucht [Böttners' Forcing Special Pedigree], it produces medium-large to large hearts with crisp compact leaves of a light-green colour. One of its principal advantages is its high degree of resistance to *Bremia lactucae*.

3482 STEWART, J. K. & FOSTER, R. E.

**Observations on rib discoloration and tip burn of lettuce.**

Plant Dis. Repr. 1955 : 39 : 418-20. (Mimeographed).

Varieties and strains exhibited differences in susceptibility to the above two diseases in tests in Arizona.

3483 RUSENOVA, I.

(**Studying possibilities of shifting the cultivation of some thermophilous plants to regions with unfavourable temperature conditions by grafting them on a stock with moderate warmth requirements**).  
Izv. Inst. Rastenievädstvo (News Inst. Pl.-Industr.), Sofia 1954 : 199-202. [Bulgarian].

At Sofia, the yield and earliness of the egg plant

varieties 12 and 12 X Delikates [Delicacy] were improved, without impairing their flavour, by grafting the plants on a stock of the tomato hybrid Zarja [Dawn] x Komet [Comet]. Similar results were obtained by grafting the melon Mramorni [Marble] on an unspecified gourd stock. It is concluded that the cultivation of the egg plant and melon can be shifted to colder regions by accelerating their maturation in this way.

3484 PARODI, L. R.

*Cucumis melo*, var. *flexuosus*, rara hortaliza cultivada en la Argentina. (*C. melo* var. *flexuosus*, a rare vegetable cultivated in Argentina).

Rev. argent. Agron. 1955 : 22 : 5-10.

Descriptions are given of a number of botanical varieties of *C. melo* cultivated in Argentina, many of them being used as a vegetable in place of cucumbers. Their chromosome numbers are also indicated.

3485 KITCHIN, J. T.

**Vegetable comments.**

Hort. News, NJ 1955 : 36 : p. 2894.

The fruits of the early cantaloupe Pennsweet weigh 1½-2 lb. each and have thick sweet flesh with a small seed cavity. The variety was bred by the Pennsylvania Agricultural Experiment Station for growing in Canada and the northern states of the USA.

Golden Beauty, a yellow sweet corn released by the University of Massachusetts, requires about 75 days to mature, bears 12 to 14 rows of kernels per ear and is of good quality. In tests in New Jersey it yielded well and showed about 18% bacterial stalk wilt.

3486 Pennsweet muskmelon wins award for excellence. Science for the farmer.

Pa. agric. Exp. Sta. 1954 : 2 : No. 3 : p. 3.

Pennsweet matures early, producing thick-fleshed fruits each weighing 1½ to 2 lbs., with a sugar content of 11.5 to 15%. Developed from a cross between an early unnamed breeding line with poor quality and Golden Gopher, it is recommended as suitable for domestic gardens and for supplying local markets.

3487 ANDRUS, C. F.

**New watermelon varieties bring new life to that industry.**

Seed World 1955 : 76 : No. 5 : 36-40.

New or relatively new varieties in the USA are discussed in detail with reference to resistance

to *Fusarium* wilt and anthracnose, transportability and suitability for cultivation in domestic gardens.

3488 MATSUBAYASHI, M.

(Studies on the characteristics of triploid water melons. I. On their morphological characteristics as compared with those of diploid water melons).

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 183-88. [Japanese].

A comparative study of the morphology of the diploid varieties Asahiyamato [Rising Sun Japanese] and Shinyamato 2 [New Japanese 2] and the triploid hybrid from  $4x$  Asahiyamato  $\times$   $2x$  Shinyamato 2 is reported. The fruits of the triploid were larger and heavier than those of the diploids and were oblate spherical instead of spherical.

3489 MATSUBAYASHI, M.

(Studies on the characteristics of triploid water melons. II. On their physiological characteristics as compared with those of diploid water melons).

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 189-95. [Japanese].

The comparative study reported in Abst. 3488 is extended here to various physiological characteristics. It was observed that, whereas the triploid grew more slowly than the diploids at first, it grew more rapidly in the later stages of development. The mesophyll and fruit flesh of the triploid had lower dry matter contents than in the diploids. Fruit setting was higher in the diploids when pollination was open but higher in the triploid when artificial pollination was effected. Seed setting in the triploid was only 0.04%.

3490 HAYASE, H.

(Studies on *Cucurbita* crosses. V. The occurrence of twin plants with a halved chromosome number in the  $F_1$  of *C. maxima*  $\times$  *C. moschata*).

Ikushugaku Zasshi/Jap. J. Breeding 1954 : 4 : 115-21. [Japanese].

A pair of haploid twin seedlings of maternal type were obtained among the offspring of the above interspecific cross. The haploids usually produced 20 univalents at meiosis though 1 or 2 bivalents or an occasional trivalent were also observed. No seeds were set when the haploids were pollinated with pollen from normal diploids.

3491 TAKASHIMA, S.

(The growth rate of pollen tubes in interspecific hybrids of *Cucurbita*. II. The growth rate of pollen tubes in intraspecific matings).

Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 36-39. [Japanese].

Continuing the researches summarized in *PBA*, Vol. XXIV, Abst. 3435, the author investigated the rate of pollen tube growth in the stigma, style and ovary of *C. moschata*, *C. maxima* and *C. pepo* at various stages in floral development. Pollen-tube growth is most rapid in the stigma and becomes progressively slower as the ovary is approached. It appears that a substance inhibiting pollen-tube development is produced in the ovary two days before flowering and that this substance is subsequently found at higher levels in the pistil. A hormone promoting pollen-tube growth appears to be formed by the stigma. When the stigma is excised, pollen tube development is retarded but the normal rate can almost be restored if  $\alpha$ -naphthalene acetic acid is applied to the cut surface of the style.

3492 TKAČENKO, N. N.

(New early-maturing and productive cucumbers for the south).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 12-13. [Russian].

Processing varieties that produce an exceptionally high proportion of plants bearing female flowers have been bred at Krymskaja, Krasnodar territory. Ruslan (Černobrivec  $\times$  Borščagovskii) outyields the standard Nežinskii and produces high-quality fruits. Hybrids 220 and 221 are still earlier and more productive than Ruslan and equal in fruit quality to Nežinskii. Both hybrids are grown only for the  $F_1$  and have Posrednik 97Ž as female parent. This variety, also originating from Krymskaja, produces mostly female flowers. Nežinskii and 96-1, which have similar characteristics, are the pollen parents of hybrid 220 and hybrid 221 respectively.

3493 TORTI, M.

Il buon seme nella coltivazione del pomodoro. (Good seed in tomato growing).

G. Agric. Domen. 1955 : 65 : p. 101.

Comment is made on the loss in quantity and quality of the tomato crop in Italy owing to failure to use selected seed; the varieties of which selections are available are enumerated



and indications are given of the main characteristics of each variety, its origin and the purposes for which it is suitable.

3494 BRASHER, E. P.

**Introducing Wiltmaster, a new processing variety of tomato for Delaware.**

Bull. Del. agric. Exp. Sta. 1954 : No. 310 : unpaginated.

Wiltmaster, selected at the University of Delaware Agricultural Experiment Station from Southland x Rutgers, is highly productive and immune from common races of *Fusarium* wilt. The fruit is dark red but resembles that of Rutgers in most other characters.

3495 CRNKO, J.

**Estudios comparativos sobre variedades de tomate. (Comparative studies on tomato varieties).**

Idia 1954 : No. 83 : 7-25.

A collection of 53 varieties, comprising a number of standard international types, was examined at Mendoza in Argentina. Brief descriptions of the varieties are presented; Sioux is mentioned as being especially promising for Argentine conditions among the early varieties; some selections of it made at the local experimental station have somewhat denser foliage and are thus less prone to damage by heat. Stokesdale is also commended for its high content of solids and vitamin C in the fruit and Marman for its earliness and firm flesh and skin. In the midearly group Lakeland is outstanding, in the midlate Southland and in the late group Pearson C.

The popular local variety Platense is very inferior in fruit quality, in which respect some of the selections from it, notably Magnif Soberrano [Sovereign Magnif] from the Castelar station, are distinctly superior. The local variety Perita (= San Marzano) is still the most popular for industrial use.

3496 TREE, E. F.

**Varietal trends in the tomato crop at Bowen.**

Qd. agric. J. 1955 : 80 : 88-91.

The chief varieties grown at Bowen, Queensland, are described briefly. Promising selections from a natural cross between Bowen Globe and the strain from which Q3 was derived combine the vigour of the former parent with the desirable fruit qualities of the latter. Selections with a compact habit and fruit of high quality have

been obtained from Cavalier (cf. PBA, Vol. XXII, Abst. 2554).

3497 BARTON, D. W., BUTLER, L., JENKINS, J. A., RICK, C. M. & YOUNG, P. A.

**Rules for nomenclature in tomato genetics, including a list of known genes.**

J. Hered. 1955 : 46 : 22-26.

The rules of nomenclature drawn up by the Tomato Genetics Cooperative of the USA for the designation of genes and chromosomal aberrations are presented. A table is given listing 107 gene symbols, the corresponding main phenotypic characters, synonyms and references in the literature.

3498 SOOST, R. K.

**Gene dosage effect of the *Wo* gene in tomato.**

Genetics 1954 : 39 : p. 995. (Abst.).

Individuals with one, two or three doses of the dominant lethal gene *Wo* for "woolliness," were normal in growth and fertility; plants with four *Wo* genes were not recovered. Phenotypic woolliness increased with the gene dosage, the enhancement of this character being caused by increase in the numbers of branched trichomes and branches per trichome. Trisomic plants with one *Wo* gene had almost the same degree of woolliness as the *Wo* diploid form. The introduction of *Wo* into four vigorous varieties did not increase the viability of the diploid *Wo* homozygote.

3499 TOMES, M. L., QUACKENBUSH, F. W. & MCQUISTAN, M.

**Modification and dominance of the gene governing formation of high concentrations of *Beta*-carotene in the tomato.**

Genetics 1954 : 39 : 810-17.

The gene pair *Bb* determines the occurrence of high vs. low concentration of  $\beta$  carotene, the genotype *bb* producing mainly lycopene; *B* has been found to be dominant, and not incompletely dominant, as previously postulated. Commercial red-fruited strains possess at least one independently inherited major modifier of *B*, designated *I<sup>B</sup>*, which when present in either the homozygous or heterozygous conditions partially inhibits the action of *B* in producing  $\beta$  carotene. Preliminary data have been obtained suggesting that *I<sup>B</sup>* also influences the production of  $\beta$  carotene in plants homozygous for *b*.

3500 AIZENŠTAT, JA. S.  
(Variation of dominance according to the position of the flowers on the maternal plant).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 151-57. [Russian].

Pollination of the first inflorescence of *Lycopersicon cerasiforme* with Bison gave  $F_1$  plants in which the Bison characters were dominant whereas from pollinations effected on the 3rd-4th inflorescences the  $F_1$  plants resembled *L. cerasiforme*. Similar reversal of dominance was observed in a number of other crosses and tabular data are presented which show that in most  $F_1$  generations from inflorescences 3-4 the maternal characters tended to dominate and in those from inflorescences 1-2 and 6-7 the paternal characters. In the crosses Korolj Gumbert [King Humbert] x Earliana and *L. cerasiforme* x Break o' Day the greatest dominance of the maternal characters was in the progeny from inflorescences 6-7.

The results are interpreted as a confirmation of Mičurin's principle that plants at the height of their development transmit their characters most efficiently.

3501 ALPATJEV, A. V.  
(New tomato varieties).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 10-11. [Russian].

Some new high-yielding varieties obtained by multiple hybridization at Gribovo are described; Patriot 2170 produces good quality fruit and is suitable for indoor and outdoor cultivation; Krasnoznamennyi 02200 [Red Banner 02200] outyielded all varieties under trial, and Gruntovyi Desertnyi 02201 [Outdoor Dessert 02201] is 6-12 days earlier than Bison and produces round smooth fruits of excellent flavour. It is as productive as Bison and shows resistance to diseases.

3502 Seven flowers and two vegetables.

Sth. Seedsman 1955 : 17 : No. 12 : 54-55.

Burpee's Big Early Hybrid is an early, large-fruited  $F_1$  hybrid tomato. The cantaloupe Burpee Hybrid, also an  $F_1$  hybrid, has heavily netted, ribbed fruits weighing 3-3½ lb. each, and is adapted to the eastern and midwestern USA. Both were bred by the W. Atlee Burpee Co., Floradale Farms, Calif.

3503 BREŽNEV, D. D.

(Biological methods of improving the racial qualities of seeds).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 197-98. [Russian].

Experiments on intravarietal crossing in the

tomato varieties Bison and Break o' Day showed that greater yield improvements were obtained when pollination of emasculated flowers was effected with a mixture of pollen from different plants of the same variety but grown in widely different geographical areas. Thus in Break o' Day, plants grown from seed obtained from mixed pollen from plants grown under the same conditions gave a yield of 1923 g. of fruit per plant; those from mixed pollen from three plants grown under different conditions gave 2037 g. and those from mixed pollen from three plants all grown in different places gave 2354 g.; the controls gave 1227 g. In Bison the respective yields were 1325 g., 1461 g. and 1430 g., with 1259 g. from the control.

3504 BURDICK, A. B.

Two types of heterosis in the tomato revealed by constant parent regression analysis.

Genetics 1954 : 39 : p. 963. (Abst.).

Heterosis was expressed as increase in plant size and earliness of flowering. In crosses between widely different types, the hybrid plant proved on the average to be 28% heavier than the larger of its parents at the age of 90 days. Such hybrids were usually intermediate with respect to their parents in time of flowering but produced ripe fruit 1.62 days before their earlier parents. Constant parent-regression analysis of data on plant size and earliness (period from flowering to production of ripe fruit) gave  $b_2 = 0.0010$  and  $-0.0333$  for these two characters respectively. It is permissible to ascribe the  $b_2$  value for plant size to epistasis and that for earliness to dominance. Study of the data on earliness suggested that genes from one parent may control development at one stage whereas genes from the second parent may do so at another stage; the term codominance is proposed for this phenomenon (cf. Abst. 604).

3505 BREŽNEV, D. D.

(The use of heterosis in tomatoes).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 45-56. [Russian].

Six different varieties serving as seed parents were emasculated and pollinated with a range of pollen parents in 21 different combinations. The  $F_1$  plants were grown at the Gribovo breeding station in 1937; they were more healthy and vigorous than seedlings of the parental forms and in 17 of the 21 combinations ripened before either parent, the difference in earliness varying from 8 to 11 days; 15 of the hybrids exceeded the better parent in yield of fruits and all



exceeded the average of the two parents; a larger proportion of the fruits ripened on the hybrids than on the parents.

In the following year 20 hybrid combinations were tested near Leningrad; all were equal to the earlier parent or earlier in both flowering and ripening and 15 of them yielded more than the higher-yielding parent. In both years the hybrids bore fruit intermediate between the two parents in size; the hybrid fruits were more healthy and in chemical composition and vitamin content they did not differ significantly from the parents.

In crosses between varieties of similar morphological type, such as Break o' Day x Marglobe, a greater yield increase was obtained when the parent plants were grown under widely different conditions; from this it is concluded that heterosis is not a genic effect but a biological phenomenon involving the interaction of the organism as a whole with the environment.

3506 ŽUKOV, P. V.

(Hybrid tomatoes).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 4 : p. 74. [Russian].

Direct and reciprocal hybrids that were obtained by restricted open pollination of Mikado and Sparks resembled the first-named variety in fruit colour and leaf shape and the other in fruit shape. The  $F_1$  plants had double the yield of their parents, produced larger fruits and showed resistance to blossom-end rot.

3507 ZONIĆ, I. & DUMANOVIĆ, J.

[Heterosis in the yield of the  $F_1$  generation of tomatoes (*Lycopersicon esculentum*)].

Zborn. Rad. poljoprivred. Fak./Rev. Res. Wk. Fac. Agric. 1954 : 2 : No. 2 : 145-57. [Serbian].

The  $F_1$  of 12 hybrid combinations involving 7 varieties and lines has been investigated at Zemun. In 10 hybrid combinations yield increases of 2%-32% over the higher-yielding parent were obtained, while in the remaining two reductions of 1% and 4% respectively occurred. Komet [Comet] x Zarja [Dawn] was 10 days earlier and Rutgers x Veleški Jabučar [Veleški Apple] yielded 20% more fruits than the respective reciprocal. Most hybrids were earlier than the parents, one later and a few intermediate. The  $F_1$  showed great variability in the number of fruit-bearing vines, some hybrids showing a reduction, others an increase over both parental forms. Most  $F_1$  plants were

intermediate in the yield of fruit per plant although some produced the same number of fruits as the low-yielding parent or gave fewer fruits. Kidney-shaped fruits were dominant over spherical and spherical over ribbed. Potato-shaped leaves were dominant over normal leaves.

3508 BATEMAN, A. J.

Grafting experiments between the tomato varieties, Golden Apple and Oxheart.

Nature, Lond. 1955 : 175 : 1118-20.

The author has repeated the grafting experiments carried out by Felföldy on the above two varieties (cf. *PBA*, Vol. XXII, Abst. 1525). Some of the grafts were in all material respects similar to those made by Felföldy but others were modified so as to increase the physiological dependence of scion on stock and thus, according to Mičurinist principles, increase the likelihood of graft hybrids. Observations on the fruit characters of 1072 first seed-generation plants from Golden Apple grafted on Oxheart and the reciprocal provided no evidence of vegetative hybridization. Felföldy has supplied the author with the results obtained from raising a further seed generation. Considering the results from both generations, it is suggested that while some of the variants described by Felföldy are difficult to explain, others may be attributed to environmentally produced variation, chance hybrid origin of a scion or polymorphism for fruit shape in the original strain.

3509 BREŽNEV, D. D.

(Variability of characters used in varietal certification in tomatoes).

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1950 : 28 : No. 3 : 29-39. [Russian].

Seeds of 30 standard varieties were sown at Maikop in the south of the Soviet Union and near Leningrad in the north. The differences between the northern and southern plantings were in some cases so pronounced as to have disqualified the variety for varietal authenticity if the accepted standards had been applied. Fruit form and size, number of locules, type of fruit cluster, time of ripening and content of vitamin C were among the characters most affected. The differences are ascribed mainly to the fact that at Leningrad the plants were topped whereas Krasnodar they were not and it is suggested that the results are more consonant with the Lysenko theory of heredity than with Mendelian genetics.

- 3510 FILUTOWICZ, A. & KUŹKOWICZ, A.  
Porównanie sześciu generacji pomidorów tetraploidalnych z diploidalnymi. (**A comparison of six generations of tetraploid with diploid tomatoes**).

Acta Soc. Bot. Polon. 1954 : 23 : 459-69.

Treatment of 50 seedlings of the variety Immune (Immune) with colchicine gave 29 tetraploid plants. The subsequent generations, obtained from these tetraploids during 1949-53, were used in comparing the morphological, anatomical, physiological and economic characteristics of the tetraploid with those of the original diploid.

In contrast to the diploids the tetraploids exhibited: (1) considerably broader and slightly shorter cotyledons, a feature maintained with little variation throughout successive generations and attributed to the larger cells of the tetraploids and also to the lowered ratio of length to breadth of the cell; (2) larger and more pubescent leaves; (3) smaller fruits, though this difference decreased as selection progressed; (4) luxuriant habit in all generations, though dwarf forms still occurred in the  $F_1$ - $F_3$ ; larger guard cells, though not of uniform size; and (6) slower germination and later shoot production and, despite subsequent faster growth, later flowering and ripening. Three cotyledons, an aberration very rare in the diploid, occurred with a frequency varying from 7% in the  $F_2$  to 3.2% in the  $F_6$ .

Aberrations in reduction division in the tetraploids are related to their partial infertility.

An apparent slightly greater sensitivity of the tetraploids to spring frosts was not confirmed statistically.

- 3511 BREŽNEV, D. D. & AĪZENŠTAT, J. S.  
(**Variability of tomato hybrids cultivated in different physioclimatic zones**).

Agrobiologija (Agrobiology) 1955 : No. 1 : 46-54. [Russian].

A number of hybrids showed variability in respect of the number of loculi and the shape and biochemical properties of the fruits when raised under different climatic conditions. Data showing how these characters varied when the plants were grown at Puškin, Maikop, Taškent and Čelkar respectively are presented.

- 3512 MCGUIRE, D. C. & RICK, C. M.  
**Self-incompatibility in species of *Lycopersicon* sect. *Eriopersicon* and hybrids with *L. esculentum*.**

Hilgardia 1954 : 23 : 101-24.

*L. peruvianum*, *L. peruvianum* vars. *dentatum*

and *humifusum*, *L. glandulosum* and *L. hirsutum* were found to be self incompatible in both California and their native habitats. A detailed study of one collection of *L. peruvianum* revealed that self incompatibility in this species is controlled by an oppositional system of S alleles similar to that in *Nicotiana*. Such a system also appeared to govern self incompatibility in the other varieties and species referred to above. *L. hirsutum* f. *glabratum* proved to be self compatible. A few seeds were obtained from incompatible matings within *L. peruvianum* when plants of slightly reduced vigour were used. Attempts to induce pseudofertility by pruning and other methods failed. Hybrids between *L. esculentum* and *L. peruvianum* were as highly self incompatible as the latter parent but matings between hybrids of different parentage were highly compatible. As ♀ parents, the  $F_1$  hybrids crossed readily with *L. peruvianum* but not with *L. esculentum*; as ♂ parents the  $F_1$  hybrids mated successfully with *L. esculentum* but not with *L. peruvianum*; mating relationships similar to these were usually found between  $F_2$  plants and the parental species. It is postulated that the S alleles behaved in the  $F_1$  and  $F_2$  in the same manner as in *L. peruvianum* but opposed *se*, a recessive allele for pollen fertility from *L. esculentum*. A number of deviations from the results expected from crosses between  $F_1$  and  $F_2$  plants and from other combinations suggested, however, that this hypothesis may require some modification.

- 3513 VASIĆ, A. & NIKETIĆ, G.  
(**A study of the technological properties of some tomato varieties**).

Zborn. Rad. poljoprivred. Fak./Rev. Res. Wk. Fac. Agric. 1954 : 2 : No. 2 : 184-95. [Serbian].

Of the 25 strains tested at Zemun, Mikado produced the largest fruits, Marglobe had the lowest percentage of skin and Pierrette the highest of seed. Plovdivska Konzerva [Plovdiv Processing] exceeded all others in dry substance, sugar and vitamin C contents.

- 3514 ŠUIN, K. A.  
(**Characteristics of tomato seed depending on the position where it developed on the mother plant**).

Sad i Ogorod (Gdn. & Veg. Gdn.) 1955 : No. 6 : 19-20. [Russian].

Fruits borne on the second and third bunch produced seed more viable than that from the first bunch. Their progenies were also characterized by greater earliness and improved yield.



- 3515 ALEXANDER, L. J. & HOOVER, M. M. (Editors)  
**Disease resistance in the wild species of tomato.**  
Res. Bull. Ohio agric. Exp. Sta. 1955 : No. 752 : Pp. 76.

Reports are given of the results of cooperative tests carried out in the USA and Canada during 1952 and 1953 to screen 144 accessions of *Lycopersicon hirsutum*, *L. hirsutum* var. *glabratum*, *L. peruvianum*, *L. pimpinellifolium*, *L. glandulosum* and suspected hybrids of *L. esculentum* x *L. pimpinellifolium* for their reactions to the following: *Alternaria* leaf spot and collar rot, *Septoria* leaf spot, *Stemphylium* blight, anthracnose (*Colletotrichum phomoides*), bacterial wilt, *Phoma* rot, tobacco etch, *Cladosporium* leaf mould, frost, fruit cracking, *Fusarium* wilt, root-knot nematodes, late blight (*Phytophthora infestans*), buckeye rot (*Ph. parasitica* var. *terrestris*), tobacco mosaic and *Verticillium* wilt.

- 3516 MILLER, P. R. & O'BRIEN, M. J.  
**Tomato late blight: its world distribution and present status.**  
Plant Dis. Reptr. 1955 : Suppl. No. 231 : 3-89. (Mimeographed).

This report gives a summary of available information on the world distribution of *Phytophthora infestans* on *Lycopersicon esculentum*, its spread, the amount of damage it causes and measures for its control. The occurrence and distribution of known biotypes of the pathogen and resistant varieties of tomato in individual countries are indicated.

- 3517 WATSON, R. D., HEINRICH, E. C. & HARVEY, W. R.  
**The inheritance of resistance to tobacco mosaic virus in an inter-specific tomato cross.**  
Res. Bull. Idaho agric. Exp. Sta. 1954 : No. 27 : Pp. 20.

Investigations were carried out on Sioux and *Lycopersicon hirsutum*, their  $F_1$  hybrid in which Sioux constituted the ♀ parent, and the two back crosses. Resistance to tobacco mosaic virus was apparently determined by two dominant genes, both required for maximum resistance and derived from *L. hirsutum*. Resistance was recovered in the back crosses in combination with other commercially desirable characters. In general, symptom expression in the field was a fairly reliable indication of resistance but with intermediate symptoms virus concentration was probably a more satisfactory criterion.

- 3518 GOTOH (GOTO), K.  
**Genetic studies on eggplant (*Solanum melongena* L.). III. Further investigations regarding the degree of heritability and the number of effective factors.**  
Idengaku Zasshi/Jap. J. Genet. 1954 : 29 : 89-97.

In continuation of the researches summarized in PBA, Vol. XXIV, Abst. 1512, the author determined the heritability and number of effective factors concerned with flowering period, fruit shape (length/width) and fruit weight in the  $F_1$ - $F_3$  of Florida High Bush x Sendainaga and Turubososenari x Taiwannaga. Heritability was calculated from the  $F_2$  and  $F_3$  parent-offspring regressions; the number of effective factors was estimated by Mather's method (cf. PBA, Vol. XIX, p. 913). The heritability values for flowering period, fruit shape and fruit weight were 65-78%, 60-75% and 40-60% respectively. Conspicuous differences between the crosses were noted in respect of the  $F_2$  variances for flowering period and fruit shape. The estimates of the number of effective factors were extremely low and of doubtful validity. In most cases  $K_1 > K_2$ .

A very wide range of recombinants was obtained in the  $F_3$  of the first cross mentioned; some of these are of potential value for breeding.

- 3519 SINGH, H. B. & SIKKA, S. M.  
**These Pusa brinjals should interest you!**  
Indian Fmg. 1955 : 5 : No. 2 : 18-21.

The eggplants Pusa Purple Long and Pusa Purple Round, each selected from an indigenous variety at the Indian Agricultural Research Institute, New Delhi, are described. It is noted that the first variety is fairly resistant to shoot borer and the second highly resistant to little-leaf virus.

- 3520 HUBBELING, N.  
**Ziekten en beschadigingen van bonen. (Bean diseases and injuries).**  
Tuinbouwvoorlichting 1955 : No. 3 : Pp. 80.

An account, illustrated by coloured plates, is given of damage caused to beans as the result of mineral deficiencies, attack by insect pests and infection by fungous, bacterial and virus diseases. The modes of transfer of the different diseases from diseased to healthy plants and cultural and chemical methods of combating both insect pests and diseases are discussed. Tabulated data on varietal differences in susceptibility to the principal diseases are also

provided, together with a short chapter on current breeding work, at Wageningen and elsewhere, aimed at developing resistant varieties.

3521 ROWLANDS, D. G.

**A genetic paradox in relation to bean breeding.**

Heredity 1955 : 9 : p. 151. (Abst.).

In Britain attempts to breed improved types of *Vicia faba* have so far met with discouraging results and a slight fall in the average yield per acre in commercial sowings has occurred during the past 75 years. Cytological survey of varieties from different parts of the world has revealed a genetic instability of the type which arises through inbreeding of a natural out-breeder. That *V. faba* is essentially an out-breeder has been confirmed by (1) study of pollen growth in cultures to which aqueous stylar extracts were added and (2) pollination experiments.

3522 **The Processor and Tenderbest.**

Sth. Seedsman 1954 : 17 : No. 9 : 43, 63.

Processor is a white-seeded selection from an unnamed garden bean with smooth stringless pods about 5½ inches long, while the drought-resistant selection Tenderbest MR has mottled seeds and smooth straight pods about 6 inches long. Both are heavy-yielding, highly resistant to the common and New York 15 strains of mosaic and tolerant of root rot.

3523 VARGAS SACO, R.

**Cultivo del frijol. (Cultivation of the French bean).**

Bol. Estac. exp. agríc. La Molina 1954 : No. 54 : Pp. 94. (Mimeographed).

The view is expressed that *Phaseolus vulgaris* originated in Peru and was domesticated there in the pre-Inca period. The bulletin deals with the botany and systematics of the species and the varieties grown in Peru and elsewhere; the variety Caraotas Negro from Venezuela is least attacked by insect pests, such as *Epinotia opposita* and *Laspeyresia leguminis*, and by fungous diseases and is included in the group of varieties capable of giving the highest yields, up to 2000 kg. per ha. under favourable conditions, of beans of good quality; the only defect of the variety is its black seed coat. Varieties from the USA, though good in quality, are susceptible to most diseases and pests and uncertain in yield; the best in respect of earliness and yield were California FSW, Red Kidney, White Kidney and Michilite Pea.

Data are given on methods of cultivation and on the main diseases and pests of French beans in Peru.

3524 ENKEN, V. B.

**(Susceptibility of *Phaseolus* species to bacterial attack).**

Trud. priklad. Bot. Genet. Selekc. (Bull. appl. Bot. Gen. Pl.-Breed.) 1949 : 28 : No. 2 : 90-118. [Russian].

The following bacterial species were isolated from a collection comprising a number of different species and varieties of *Phaseolus*: *Bacterium phaseoli*, *B. phaseoli* var. *fuscans*, *B. medicaginis* var. *phaseolicola*, *B. vignae*, *B. vignae* var. *leguminophilum* and *B. heterocephalum*. The symptoms caused by them are described and details are given regarding the species they attack. All varieties of *Ph. vulgaris* proved susceptible in some degree to *B. phaseoli* but some forms of *Ph. multiflorus* were completely resistant; in *Ph. vulgaris* differences were however observed in degree of susceptibility: the dwarf variety Africa White was one of the least attacked by *B. phaseoli* and by *B. phaseoli* var. *fuscans*; next in order came the semidwarf varieties Beloe Jaico [White Egg] and Želtyi Glazok [Yellow Eye]; two climbing varieties Scozia and Striped Crease also showed consistently low infections. The varieties Chocolate Asparagus, Golden Mountain and Mont d'Or are also mentioned as of possible interest for crossing.

The Robusta group and a number of other varieties are resistant to *B. medicaginis* var. *phaseolicola*.

Brief descriptions are given of the main types of bean recognized, with indications of varieties regarded as representative of each type.

3525 LORZ, A. P. & WALTER, J. M.

**Pole bean breeding in Florida.**

Proc. Fla. hort. Soc. 1954 : 67 : 157-58.

Selections from crosses between Pinto 5 and an F<sub>4</sub> selection from Black Valentine x Potomac are being crossed with selections from a commercial type in an attempt to combine the rust resistance and stringlessness of the former with the desirable pod characters of the latter.

Of the three lines Florida 501, 201-2 and 202, developed from Pinto 5 x Ferry-Morse 191, the last two are early, productive and resistant to rust and common bean mosaic. Fla. 201-2, the higher-yielding of the two, is also resistant to southern bean mosaic.

It is hoped that beans suitable for both canning and fresh marketing will be obtained from crosses between Blue Lake and Florida 201-2.

3526 SINGH, H. B. & SIKKA, S. M.

**Cowpeas that do better.**

Indian Fmg. 1955 : 4 : No. 12 : 16-18.

Two new varieties from the Indian Agricultural



Research Institute, New Delhi, are described. Pusa Phalguni, a selection from Dolique du Tonkin, has a dwarf bushy habit and matures in 60 days, producing two flushes of dark green, erect pods, five inches in length, with small, cylindrical white seeds. Pusa Barsat is a selection from seed from the Philippines. Suitable for raising as a monsoon crop, it matures in 45 days, yielding two or three flushes of light green, pendant pods, 10–11 inches long, containing large green seeds.

3527 HARE, W. W.

**Progress made in breeding disease resistant peas.**

Miss. Fm. Res. 1954 : 17 : No. 11 : 2, 6.

An account is given of the development of the breeding strain Mississippi S-1, a cowpea selection closely resembling Brown Sugar Crowder but resistant to race 1 and tolerant of races 2 and 3 of *Fusarium* wilt.

3528 VEATCH, C.

**Soybean variety trials in West Virginia, 1947–1953.**

Bull. W. Va. agric. Exp. Sta. 1955 : No. 370 : Pp. 13.

The results of seven-year tests on the seed or hay production of several varieties at two centres in West Virginia are summarized.

3529 SCARASCIA, G. T. & SCARASCIA-VENEZIAN, M. E.

Effetti citologici e caratteristiche biochimiche degli estratti acquosi di una serie di semi di *Soja hispida* M. di diversa età. (Cytological effects and biochemical characteristics of aqueous extracts from a series of seeds of *S. hispida* M. differing in age). Caryologia 1954 : 6 : 247–70.

These experiments showed that the seeds of *S. hispida* contain a mutagenic agent that becomes more effective as seeds age.

3530 LORDELLO, L. G. E.

**Nematodes attacking soybean in Brazil.**

Plant Dis. Repr. 1955 : 39 : 310–11. (Mimeographed).

The soya bean variety La41–1219 is attacked by the root knot nematode *Meloidogyne incognita* in the Bauru region, São Paulo, but has proved resistant to a new species in the Campinas region which is closely related to *M. incognita*.

3531 FRIBOURG, H. A. & JOHNSON, I. J.

**Response of soybean strains to 2,4-D and 2,4,5-T.**

Agron. J. 1955 : 47 : 171–74.

Tests were carried out at the Iowa Agricultural

Experiment Station to determine the response of 183 oriental introductions when treated with 2,4,5-T at the rates of 1/10 and 1/4 acid equivalent per acre. Forty of the strains were also tested for their seedling reaction to 2,4-D when this was applied to the first trifoliate leaf at concentrations of 50 and 100 ppm. by the microdroplet technique in the greenhouse. The strains showed highly significant differences in response to 2,4,5-T, as indicated by reduction in seed yield, and in reaction to 2,4-D as determined by reduction in size of the second leaf. Field response to 2,4,5-T and seedling reaction to 2,4-D showed a low negative correlation.

3532 Seed bulletin. Peas and fieldbeans. IVRO, Wageningen : 1955 : Pp. 8.

Brief descriptions are given of the principal varieties of blue peas, marrowfats, yellow peas and field beans recommended for cultivation in the Netherlands in 1955 (cf. Absts. 2527–30).

3533 DE HAAN, H.

**The breeding of peas in the Netherlands. 2. Marrowfats, dun peas and maple peas.**

Euphytica, Wageningen 1955 : 4 : 67–75.

In the second paper in this series (cf. Abst. 2527), varieties of marrowfat, dun and maple peas bred at various stations in the Netherlands since 1886 are noted, their pedigrees are given and their reaction to top yellows (referred to in the earlier paper as *Fusarium solani* but now identified as a virus disease) and to *Fusarium* wilt is indicated.

3534 WELLENSIEK, S. J. & ROELANDS, C. G.

**The linkage-group *Fl-Pl-P* in *Pisum*.**

Genetica 1955 : 27 : 449–52.

By means of the back-cross method it was found that the three genes *Fl*, governing the expression of grey spots on the stipules, *Pl*, causing black hilum colour, and *P*, controlling the production of parchment-like pods, belong to a single linkage group and are arranged in the above order. The percentages of crossing-over were: *Fl-P*, 9.9; *Fl-P*, 31.6; and *Pl-P*, 27.3. The percentage of double crossing-over was 2.8.

3535 SCHEIBE, A.

Die Wirkung der natürlichen Auslese bei *Pisum arvense*-Formen mit und ohne Wachsschicht. (The effect of natural selection in *P. arvense* forms with and without a waxy layer).

Züchter 1955 : 25 : 97–103.

A study was made of the effects of natural selection, under field conditions, within a population consisting initially of equal proportions of peas with waxy leaves and a mutant

waxless strain of the same variety. In the first year of harvesting, waxy forms displayed a slight preponderance over waxless; by the end of the fourth year the proportion of waxless genotypes had been reduced to 24.2% in mixed sowings with oats and to 19.1% in cultures containing only peas. In dry seasons, waxless forms were at a greater disadvantage compared with the normal genotype than in years with a high rainfall. The negative selective value of waxlessness is attributed to the increased rate of transpiration found in peas possessing this character. When sown in mixed culture, however, the waxless genotypes are provided with some degree of protection from the sun by the other crop. The implications of the above findings on the past evolution of waxiness in peas are discussed and a parallel is drawn between these experiments, which were carried out at the Max Planck Institute for Breeding Research, Neuhof, Germany, and Harland's observations on waxiness in *Ricinus communis* in the Lima area of Peru (cf. *PBA*, Vol. XVII, Abst. 1475).

- 3536 KRESS, H.  
Sortenwertlinien und Anbauzonen. IV. Teil: Speise- und Futtererbsensorten. (**Varietal evaluation curves and zones of cultivation. Part IV: Garden and field pea varieties**).  
Dtsch. Landw., Berl. 1955 : 6 : 167-72.

The relationship between variety and environment was studied at a number of centres in Eastern Germany during the period 1948-53. On the basis of these observations, recommendations are made as to the varieties most suitable for cultivation under the varying climatic conditions of the German Democratic Republic and diagrams in which the zones of cultivation of the different varieties are delineated are provided.

- 3537 INOUE, Y. & SUZUKI, Y.  
(**Studies on flower-bud differentiation, flowering and fruit setting in peas. I. On flower-bud differentiation and development**).  
Engeigaku Kai Zasshi/J. hort. Ass. Japan 1954 : 23 : 177-82. [Japanese].

Detailed comparative studies of the differentiation and subsequent development of the flower buds of 14 Japanese and introduced varieties were made. Varietal differences were noted in date of differentiation (early varieties differentiating earlier), period from differentiation to flowering, and number of leaves at the time of differentiation.

- 3538 SCHNEIDER, A.  
Über das Garkochen von Trockenspeiserbsen und dessen exakte Bestimmung mit Hilfe eines modifizierten Texturemeters. (**On cooking dried garden peas until they are tender and the exact determination of tenderness with the aid of a modified texture-meter**).

Züchter 1955 : 25 : 181-85.

The apparatus described facilitates a rapid evaluation of the cooking quality of dried peas. Developed at the Quedlinburg Plant Breeding Institute, Eastern Germany, it will be employed in testing the cooking quality of new varieties and strains intended for commercial sale as dried peas.

- 3539 SCHROEDER, W. T., PROVVIDENTI, R., BARTON, D. W. & MISHANEC, W.  
**Improving processing pea varieties.**  
Fm. Res. 1955 : 21 : No. 2 : 6-7.

Breeding material available for the improvement of processing varieties at the Geneva Agricultural Experiment Station, NY, includes: various foreign introductions, mostly wild peas of poor eating quality, which have been identified as potential sources of tolerance to *Aphanomyces* and *Fusarium* root rots and of resistance to pea enation virus and powdery mildew; processing varieties with combined resistance to *Fusarium* wilt and near-wilt; and a few lines showing heat tolerance.

- 3540 KVASNIKOV, B. V. & DOLGIH, S. T.  
(**Breeding leguminous plants for an improvement in intensity of production of nodules**).  
Zemledelie (Agriculture) 1955 : No. 2 : 105-09. [Russian].

Strains of peas and *Phaseolus* that combine high yield and very active symbiosis with the root-nodule bacteria have been selected from varieties and hybrids at the Institute of Horticulture, Moscow province.

- 3541 OKE, J. G.  
**Natural tetraploidy in *Cicer arietinum* L.**  
Proc. Indian Acad. Sci. 1955 : Sect. B : 41 : 220-26.

A cytological comparison of an autotetraploid mutant with the corresponding diploid revealed a marked resemblance between the two forms in both size and shape of the chromosomes. The tetraploid, which was cross sterile with the diploid, showed a high proportion of quadri-valents at metaphase I in the pollen mother cells;



unequal distribution of chromosomes and the formation of micronuclei were also apparent, and seedlings resulting from selfing frequently contained an extra chromosome in the somatic complement. Maximum pollen germination was obtained with 12% sugar solution for the tetraploid and with 7.5% for the diploid, indicating the existence of a higher osmotic pressure in the former.

3542 SINGH, H. B. & SIKKA, S. M.

**If it is guar, here are two new Pusa strains.**

Indian Fmg. 1955 : 5 : 8-11.

Two new productive varieties of *Cyamopsis psoraloides* suitable for use as a vegetable are described. Pusa Sadabahar, selected at the Indian Agricultural Research Institute, New Delhi, from the local variety Jaipuri, is an unbranched type bearing dark green pods 4½-5 in. long, which ripen 45 days after sowing when grown as a summer crop and 55 days after sowing in the rainy season.

Pusa Mausmi, also selected from a local variety, is sparingly branched, with pods 4-4½ in. long which reach maturity 75-80 days after sowing; it is recommended for growing in the rainy season only.

3543 KRAFT, J.

**Sockermajs. En köksväxt för handelsmässig odling. (Sweet corn. A vegetable for commercial cultivation).**

Weinbulls Allehanda 1955 : 10-13.

Data on the size and quality of the cob, correct time of sowing and soil requirements are presented for the varieties Mette, Golden Rocket, Jordmån and Gödsling, all four of which are recommended for cultivation in southern Sweden.

**3544 New hybrids rate high. Corneli's Sweetangold and Prosperity prominent in 1953 sweet corn trials.**

Sth. Seedsman 1954 : 17 : No. 8 : p. 47.

The two yellow sweet corn hybrids Prosperity

(cf. *PBA*, Vol. XXIII, Abst. 2288) and Sweetangold, both bred by the Corneli Seed Co., St. Louis, Mo., are described. Sweetangold is vigorous and widely adapted and bears attractive ears about 9 inches long, normally with 16 rows of kernels.

3545 LACHMAN, W. H.

**Golden Beauty sweet corn.**

Bull. Mass. agric. Exp. Sta. 1955 : No. 479 : unpaginated.

Developed at the Massachusetts Agricultural Experiment Station, Golden Beauty is a single cross between Conn. 13 ♀ and Ma. 21547-1-1 ♂. It is early maturing, producing high yields of uniform ears with 12 to 14 rows. It is resistant to both bacterial wilt and northern leaf blight; its tight husk covering is advantageous for resisting bird and insect attack.

3546 HASKELL, G.

**Internode patterns and adaptation of sweetcorn.**

Heredity 1955 : 9 : p. 149. (Abst.).

Using Anderson's method of internode ideograms, investigations at the John Innes Horticultural Institution have suggested that the earlier maturing sweet corn strains suitable for use under English climatic conditions have been derived from mutants of flints originating from the north-eastern United States. The later-maturing and less suitable strains of the Evergreen type are considered to be mutants of dents from the southern USA. Adapted inbreds, produced in England by inbreeding and selecting numerous open-pollinated and hybrid American strains, all have internode ideograms of the flint type; their  $F_1$  hybrids also have such ideograms. A high degree of heterosis has been secured by breeding within the flint type. The better adaptation of the flint sweet corns depends not only upon their earlier maturity but also upon their more satisfactory germination under cold conditions and better ear quality. It is stated that "the flint-dent complex may be an example of a supergene."

## BOOK REVIEWS

BASTINGS, L. (EDITOR)

**Directory of New Zealand science.**

Harry H. Tombs Ltd., Wingfield Press, Wellington, NZ 1954 : 3rd ed. : Pp. 232.

The first edition of this directory was published in 1948, the second in 1951. The third edition now available has not only been revised but expanded so as to include six sections providing directories of (1) scientists resident in New

Zealand or temporarily overseas on duty or study leave, (2) post-primary teachers of science and instructors in agriculture, (3) scientific and kindred societies, (4) scientific periodicals and (5) New Zealand suppliers of scientific equipment and apparatus. Every possible care has been taken to ensure the accuracy and completeness of the information provided and the directory will be found useful by those wishing

to consult a more comprehensive source of information on scientific workers and organizations in New Zealand than, for example, *The World of Learning* or *List of Research Workers, Agriculture, Animal Health and Forestry in the British Commonwealth* published by the Commonwealth Agricultural Bureaux.

### **The world of learning.**

Europa Publications Ltd., London 1955 : 6th ed. : 100s. : Pp. xii + 1026.

The first edition of this well-known guide to the educational, scientific and cultural organizations of the world appeared in 1947 (cf. *PBA*, Vol. XVII, p. 348). Recent editions, the fourth of which was reviewed in *PBA*, Vol. XXII, p. 635, have been enlarged to twice the length of the first edition which was compiled under the difficult conditions of the immediate postwar period. Apart from the expected detailed revisions made according to the information supplied by the international and national organizations concerned, some sections have undergone a more far-reaching transformation. For instance, as pointed out in the foreword, the changes which have affected the Indian universities in recent years have received particular attention; the editors have also been in increasing touch with individuals and organizations in eastern European and Far Eastern countries and have therefore been able to accomplish improvements in the entries for these countries. The editors describe a work of reference as "a growing organism"; certainly in their hands this source of information grows in usefulness and dependability.

RENSCH, B.

Neuere Probleme der Abstammungslehre. Die transspezifische Evolution. (**Recent problems of the theory of descent. Transspecific evolution**).

Ferdinand Enke Verlag, Stuttgart 1954 : 2nd ed. : bound DM 49.20 : unbound DM 47 : Pp. xi + 436 : 113 figs.

The first edition of this important book appeared in 1947 and was reviewed in *PBA*, Vol. XX, p. 178. It has come to be generally recognized as the most important treatise on neo-Darwinian evolutionary theory of recent years in the German language.

The second edition has been very thoroughly revised. It takes into account both the results of foreign research unavailable to the author at the time of the first edition and the numerous publications on the subject that have appeared since. The most extensive rewriting is to be found in the sections on correlative responses and on the

evolution of consciousness, respectively. In the first edition, a single section *Regeln der Umkonstruktion* dealt with the general problems of correlative response; in the second edition, this section has been replaced by two sections, devoted to *Regeln der transspezifischen Konstruktionsänderung* [*Rules of transspecific modification of construction*] and *Parallelbildungen* [*Parallel formations*] respectively. These two sections include most of the material of the earlier edition but this has been completely rearranged and much new material added, in particular on allometric growth. Many reviews of the earlier edition, among them the review cited above in *Plant Breeding Abstracts*, had criticized the abstruse treatment of the evolution of consciousness. This section has consequently been recast in the interests of clarity and some parts have been relegated to a smaller fount. Additional support for the author's panpsychic views is now quoted from the Upanishads and Sankara.

Botanical examples, absent from the first edition, have been sparingly introduced into the second. There has also been some revision in terminology. In the last section, for instance, the author now prefers to speak of hylopsychism rather than panpsychism.

The general conclusions and philosophic outlook are hardly affected by these changes. The present edition is in rather more intimate connexion with corresponding publications in other countries than the first edition but retains the thoroughness, individuality and philosophic bent that were such valuable and distinctive traits of the earlier edition.

LINDSEY, A. W.

**Principles of organic evolution.**

C. V. Mosby Company, St. Louis 1952 : Pp. 375 : 216 figs.

Professor Lindsey's *Textbook of Genetics*, which appeared in 1932, was reviewed in *PBA*, Vol. III, p. 152. The present volume, concerned primarily with evolution, resembles the earlier one in its broad approach and disinclination to follow too rigidly the neo-Darwinian party line. The book opens with a brief historical introduction. Four chapters then follow on taxonomy and taxonomic relationships. The principal reasons for accepting evolution are dealt with in the next two chapters which lead on to five chapters dealing in detail with the evolution of plants, animals in general, vertebrates in general, elephants, horses and camels, and man, respectively. The mechanism of evolution is discussed in relation to adaptation, genetics, Lamarckism



and current neo-Darwinism in the second half of the book. A final chapter considers the significance of evolution for mankind.

For many readers, the particular merit of the book will lie in its breadth of vision. The elimination of all reference to experiments on the inheritance of acquired characters in many standard text books is by now a recognized convention though hardly an example of scientific objectivity. The author does not support Lamarckism but provides a very useful summary of some of the more important Lamarckian experiments on pp. 284-88. He also deals frankly with the standard objections to Darwinism.

Other points that call for appreciative mention are the treatment of the species on p. 44 and the good illustrations.

There are several defects, however, in the general style of presentation. Loose and platitudinous statements abound. We encounter such mysterious expressions as "contemporary invertebrate fossils." The opening sentence of chapter III: "The source of all our knowledge of life is, axiomatically, the living world" is regarded as so significant that it reappears as "The living things of the world have been the source of all theories and all facts related to our knowledge of evolution" at the beginning of chapter XIX. A more serious cause for complaint is the anthropomorphic treatment of evolution in terms of "climbing to greater heights", "advancing", "culminating", "succeeding", "predominating", "sinking slowly towards extinction" etc. In addition, we are provided with a series of phylogenetic trees as in Figs. 83, 86 and 163, the evidence for which is exceedingly unsatisfactory.

In the final chapter, we are led to expect some startling remarks on the significance of evolution for man. Instead, we have a series of banalities mostly with no essential connexion with evolution at all. What has happened, in fact, is that the author, in his eagerness to escape from "emotional beliefs" has turned, not to biological facts, a rather indigestible diet, but to the much richer fare provided by speculative evolutionary progressivism. This is not the best background for introducing biological students to the sobriety of scientific method.

CHARGAFF, E. & DAVIDSON, J. N.  
(EDITORS)

**The nucleic acids. Chemistry and biology. Volume II.**

Academic Books Ltd., London 1955 :  
\$14.50 : Pp. xi + 576 : figs. : tables.

The first part of this valuable work (cf. p. 444)

having been devoted primarily to the physical and chemical study of the nucleic acids, volume II deals more with their biological functions. There are chapters on The nucleic acid content of tissues and cells, Cytological techniques for nucleic acids, The isolation and composition of cell nuclei and nucleoli, The deoxyribonucleic acid content of the nucleus, Nucleic acids in chromosomes and mitotic division and on The cytoplasm; there follows a series of chapters on the biosynthesis of pentoses, purines and pyrimidines, nucleosides and nucleotides and nucleic acids themselves. Finally the metabolism of nucleic acids and the biological role of the deoxypentose and the pentose nucleic acids are considered. Quite a body of circumstantial evidence pointing to the close connexion between DNA and bacterial transforming agents and other genetic material has accumulated but proof of direct identity has not been so readily forthcoming. There is also proof that at least certain parts of the DNA of bacteriophages and other organisms can undergo changes without any apparent genetic effect. In the aggregate however the existing information is taken to indicate that the deoxypentose nucleate-containing particle is a fundamental biological unit capable of initiating a process which can be viewed under some circumstances as genetic, or under others as infectious.

In the case of PNA, equally strong evidence exists pointing to its being the substance controlling virus multiplication; it is evidently intimately connected with protein synthesis and is dependent on the nucleus, or possibly only the nucleolus, for its elaboration; whether nuclear PNA is a direct precursor of cytoplasmic PNA seems more uncertain and many recent results indicate that independent sources of protein synthesis exist also in the cytoplasm. The template hypothesis to explain protein synthesis and specificity receives much support from the results examined, which on the whole accord with the suggestion that the action of PNA may either be that of the template itself or at least be intimately bound up with it. It is significant of the state of this part of the subject that the last chapter, on the roll of PNA, has an addendum of over six pages covering results published "in the last few months" and that the addendum closes by expressing the belief that PNA will soon "cease to be a mysterious '*deus ex machina*' and we will really begin to understand how it works."

The standard of the contributions and of the presentation in general conforms to the high level established in the first volume.

SCHRADER, F.

Mitose. Die Bewegung der Chromosomen bei der Zellteilung. (**Mitosis. The movement of the chromosomes in cell division**).

Verlag Franz Deuticke, Wien 1954 : DM 13 : Pp. 150 : 19 figs.

The first edition of this book was published in English in 1944, the second edition in 1954. These editions were reviewed in *PBA*, Vol. XV, p. 180 and Vol. XXIV, p. 653, respectively. The present version is a translation into German by J. Zopp from the second English edition. In general, the translation appears to be satisfactory. There are a few misprints, some carried over from the English edition and some new. The line drawings are clearer than those of the English edition, the half-tone illustrations less so. The present version can be cordially recommended to German readers.

EIGSTI, O. J. & DUSTIN, P. (JUN.)

**Colchicine—in agriculture, medicine, biology and chemistry.**

Iowa State College Press, Ames, Iowa, USA 1955 : \$6.50 : Pp. xiii + 470 : figs. : tables.

The modern period of research with colchicine, we now learn, began in 1889, when Pernice described its action in causing metaphasic arrest. Its role as a mitotic poison was discovered in 1934 in Brussels in the laboratory of A. P. Dustin, whose son is one of the joint authors of this, the first book dedicated exclusively to the single substance colchicine and its effects. They of course first came into prominence in 1937 with the induction of polyploidy and since then there has been an ever-increasing flow of literature on the many and various properties of this fascinating drug. The authors have not attempted to catalogue all the contributions but rather to bring together and assess the most significant. The first chapter traces the knowledge of *Colchicum* from the time of the Ebers Papyrus of 1550 BC to the "eruption" in 1937, and includes a careful evaluation of the vexed question of priority in the discovery of the polyploidizing properties of colchicine. The phenomenon of metaphasic arrest or stathmocinesis is examined from the work of Dustin in 1924 onwards, then the effects on spindle and cytoplasm and on cell growth are discussed. Chapter 5 is devoted to the various plants that contain colchicine and the chemical aspect is dealt with in a special chapter by J. D. Loudon of Glasgow University. There follow

chapters on pharmacology, on growth in animals and on cancer research and only in chapter 11 do we come to experimental polyploids; the various advantages of colchicine are expounded, terminology is explained, and an historical account of amphiploids leads to a discussion of their role in evolution and in agriculture, special consideration being devoted to the large body of literature dealing with the origin of bread wheat and the American cottons, and with the polyploid *Nicotiana* hybrids. Triploids are treated in the chapter on autopolloids, where a bibliography of 237 references is provided but only isolated examples are dealt with in the text. After a chapter on aneuploids we come, rather surprisingly, to two short chapters devoted to criteria for judging polyploidy and techniques of colchicine treatment, in animals and plants respectively, and a final chapter on the mechanism of c-mitosis compares the action of colchicine with that of other spindle poisons. It is thought to be not merely by chance that colchicine has received such preponderant attention and on account of its unique structure and properties a long continuance of its pre-eminence is predicted.

The book is provided with separate author and subject indexes. Bibliographers will no doubt quarrel with the practice in the former, and frequently also in the bibliographies at the end of each chapter, of citing authors with only their first initial. There is a certain lack of uniformity in the accentuation of the bibliographical references and some words, such as incompatibility and phytophthora, do not come through altogether unscathed in the text, where the author of the *Origin of Species* is moreover referred to as Sir Charles Darwin. On the whole, however, the standard of accuracy is relatively high for a book of this kind and the authors are to be thanked for undertaking the very difficult task of reviewing knowledge on a rapidly growing subject and for having attained such a large measure of success.

LEOPOLD, A. C.

**Auxins and plant growth.**

University of California Press, Berkeley & Los Angeles, & Cambridge University Press, London 1955: 37s. 6d. : Pp. xi + 354 : 125 figs.

In his preface the author expresses alarm that a large proportion of research work, dealing with auxins and growth regulators, is being done without cognizance of what auxins do in plants, how they are formed or destroyed there, or even



how one tests for them. He has written this book with the object of providing the agricultural research worker with a brief review of the physiological basis, so far as it is known, upon which the applied technologies rest. The first part is devoted to the fundamentals of auxin action; starting with an historical introduction, it covers such subjects as extraction and measurement, formation and movement, effects on various growth processes, the chemical nature of auxins and various theories concerning their mechanism. The second part deals with the subject of auxins in agriculture; their use in controlling rooting, parthenocarpy, fruit and flower formation, fruit fall, dormancy and storage and finally their application as herbicides and other miscellaneous uses. These include attempts to utilize the beneficial effects of auxin on fertilization in plant breeding work but it is stated that the effects have not been consistent enough to achieve widespread use.

One of the most interesting sections of the book for plant breeders will undoubtedly be the chapter on herbicides, where the physiological basis of their action is considered. Apparently no satisfactory explanation of auxin toxicity has yet been found but at least a number of factors which influence it are known and are discussed in turn; one of them of course is genetic constitution and it is pointed out that genetic differences in susceptibility often exist between otherwise closely related forms within a species. It is these differences which finally determine the selectivity of the herbicide, since all plants in some measure or another are susceptible to the effects of auxin. Among the factors involved in this selectivity are the rate of absorption and of translocation and the toxicity of the auxin to the cells themselves. The somewhat modest knowledge of the action of auxins contrasts strongly with the scale of their use, approximately 50 million acres of land in the USA having been treated with herbicidal materials in 1952. The author has done a service in calling attention to this contrast and to the need for further research on a scale at least more commensurate with the rate at which this group of substances is being used in agriculture.

SINNOTT, E. W. & WILSON, K. S.

**Botany: principles and problems.**

McGraw-Hill Publishing Co., Ltd., London 1955 : 5th ed. : 48s. 6d. : Pp. ix + 528 : figs. : plates.

As a broad elementary survey, enhanced by a fairly sumptuous presentation, this latest edition

of a text book of many years' standing has much to recommend it. The subject matter throughout most of the book is concisely treated and departs from the usual sequence in several ways, which, on the whole, make for clarity. After an introductory survey of the plant kingdom and a chapter on the physical basis of life, the morphology of root and shoot is considered in conjunction with their physiology. It is possible that some confusion may be caused to the elementary reader by the treatment of the woody stem before the herbaceous, and, in spite of illustrations excellent in themselves, some simpler and more diagrammatic representations of stem anatomy and methods of secondary thickening would perhaps be preferable. A further consideration of fundamental physiological processes, touched on in these chapters, is given next in a chapter on metabolism, which treats the subject in considerable detail, while at the same time attempting to relieve the student of any obligation to more than an elementary knowledge of chemistry. This policy is not followed with regard to mathematics, in the following chapter, where growth rates are discussed.

The chapter on The plant in relation to its environment gives a good picture of the ecological scene in very general terms. Plant distribution is similarly treated, with a discussion of the problems met with in this field.

Reproduction of flowering plants, with an account of meiosis and fertilization, is considered at this point and followed by chapters on heredity and variation, and on evolution. These topics are surveyed broadly and well for a book of this class, although to the unwary the problems involved might appear oversimple.

The concluding chapters dealing with the systematics of the plant kingdom are in general excellent. A wide range of types is presented, and photographs are abundant and serve a more useful purpose than in some other parts of the book. One is tempted to wonder whether the authors had become a little weary by the time they came to the systematics of angiosperms as this is treated so perfunctorily as to be hardly worth including.

No indication is given of the class of student for whom this book is intended. Though hardly adequate for intermediate students, it could be strongly recommended to university students with no previous knowledge of the subject. No emphasis is laid on the importance of laboratory work, and no bibliography is given. There is, however, a useful appendix of Greek

and Latin etymological roots to encourage the reader to understand botanical terminology.

ARNON, D. I. & MACHLIS, L. (EDITORS)  
**Annual review of plant physiology.**  
Vol. 6.

Annual Reviews, Inc. Stanford, California, USA 1955 : \$7.00 : Pp. xi + 505 : figs. : tables.

The sixth volume of this useful series contains eighteen contributions, most of which have direct or indirect bearing upon crop breeding and genetics (cf. *PBA*, Vol. XXIV, p. 653). Three papers are likely to be of interest to those engaged in breeding for disease resistance: Pathogenesis in the wilt diseases by A. E. Dimond; Chemical nature of disease resistance in plants by J. C. Walker and M. A. Stahmann; and Adaptation of plant pathogen to host by J. J. Christensen and J. E. DeVay. The last-mentioned contribution provides a useful analysis of the genetic changes which may be involved in the adaptation of pathogens of economic importance, namely mutation, hybridization and heterocaryosis. Two contributions have bearing upon problems of drought resistance: The water economy and the hydrature of plants by H. Walter and Water relations of plant cells and tissues by P. J. Kramer. The survey on Colour development in flowers by K. Paech includes a section on genetical aspects, referring to some of the recent literature, chiefly on ornamental species. F. M. Eaton deals with Physiology of the cotton plant, mainly in relation to cultivation in the United States. The physiology of flowering was reviewed in volume 3 of this series; a paper by J. L. Liverman integrates the advances made since then with the older information, his discussion being centred on *Xanthium pennsylvanicum*. Two contributions are concerned with photosynthesis, W. Vishniac and M. D. Thomas examining the biochemical aspects and the effect of ecological factors, respectively. F. T. Addicott and R. S. Lynch discuss the physiology of abscission. K. Mothes provides a paper on the physiology of alkaloids, including a section summarizing the main results of the few investigations carried out on the genetics of alkaloid synthesis. The remaining contributions are as follows: Mechanisms of absorption, transport, accumulation, and secretion of ions by H. Lundegårdh; Redistribution of mineral elements during development, R. F. Williams; Nitrogen metabolism, G. C. Webster; Functional aspects in mineral nutrition in green plants, A. Pirson; Chemical constitution as related to growth

regulator action, R. M. Muir and C. Hansch; and The nutrition of plant tissue cultures by R. J. Gautheret.

MATTHEWS, J. R.

**Origin and distribution of the British flora.**

Hutchinson's University Library, London 1955 : 8s. 6d. : Pp. 176 : 6 maps : 5 tables.

This new addition to Hutchinson's University Library is one of a series of volumes on biological sciences edited by Professor Munro Fox. Since our knowledge of the ecology, history and distribution of British plants has grown very considerably in the past twenty years, and since in recent years interest in these subjects has become increasingly widespread among both professional and amateur botanists, a clear and concise introduction such as is given by Professor Matthews in this little book is particularly welcome.

After an introductory chapter giving an elementary discussion of the species concept and the various factors likely to affect the distribution of species, and a second chapter in which the fossil floras of Britain in the Cretaceous and Tertiary periods are briefly surveyed, the next two chapters deal with the Glacial epoch and its associated problems of climatic change and migration and survival of species, particular attention being paid to the origins of the Iberian and Arctic-Alpine elements. This section of the book concludes with an account of the vegetational and climatic changes occurring in late glacial and postglacial times.

A short chapter on the changed ranges of a number of plants since postglacial times leads over to the second section of the book, which is concerned with the present composition of the British flora and the distribution of its elements. Watson's six primary types of distribution are discussed, the connexions between the floras of Britain and Ireland are considered and finally, in the last two chapters, Professor Matthews describes the geographical elements of our flora, his treatment being based on a modification of Forbes's classification. The species comprising these elements are listed in an appendix. A list of references and an index complete a work which, with its broad scope and clear descriptions of the complex factors affecting the development and present structure of the British flora, admirably fulfils its author's intention of serving as an elementary introduction to the study of past and present distribution of British plants.



**Flore du Congo Belge et du Ruanda-Urundi. Spermatophytes. (Flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes).**

Institut National pour l'Étude Agronomique du Congo Belge, Bruxelles 1954 : 6 : Pp. 426 : 1 map : 32 plates : 18 figs.

The first three volumes of this flora were reviewed in *PBA*, Vol. XXIII, p. 342. The next two volumes, referred to in *PBA*, Vol. XXIV, p. 482 and in the current volume, p. 267, both dealt with the Leguminosae. The present volume also treats the Leguminosae and covers the tribes Dalbergieae, Vicieae and subtribes Glycininae, Erythrinae, Galactiinae, Cajaninae and Phaseolinae of the Phaseolae.

GAMS, H. (Editor), MOSER, M. (Author)

*Kleine Kryptogamenflora von Mitteleuropa. Band IIB. Die Röhrlinge, Blätter- und Bauchpilze (Agaricales und Gastromycetales). (Pocket cryptogam flora of Central Europe. IIB. Agaricales and Gastromycetales).*

Gustav Fischer Verlag, Stuttgart 1955 : Pp. ix + 327 : 17 figs.

The correct determination of agarics is generally recognized to be one of the most difficult of botanical accomplishments, very largely because knowledge of the various Friesian species has been communicated from teacher to student in the field and the specific characteristics have been learned through ostensive definition rather than through explicit recognition of a series of citable features. Most fungus floras in the past have failed in the elementary duty of facilitating identification since they have omitted to provide keys to the species; even today there is no comprehensive British fungus flora with such keys.

Mycologists in Europe, however, have gone some way towards rectifying this situation, and in the present volume keys are provided for identifying all the Central European members of the Agaricales and Gastromycetales. Since most of these species are wide-ranging, the volume will prove valuable elsewhere in Europe, and in the British Isles. Macroscopic characters are used principally, with microscopic and chemical characteristics referred to when necessary. The final entries in the keys amount to extremely brief descriptions of the species. Habitat is indicated but not geographical distribution. The classification represents a considerable departure from the Friesian system commonly used in English-speaking countries, but though considerable generic splitting and rearrangement have been made, these have not been taken

so far as in some contemporary treatments. A table showing the correspondences between the genera used in the present volume and the traditional genera found in Ricken's *Vademecum* is included. An index of generic and of specific names is appended.

The present volume is a model of economic layout; all non-essential information is omitted and the keys are set out in a clear and easily scanned style. It is to be hoped that mycologists in other countries will be inspired to emulation.

SMITH, K. M. & LAUFFER, M. A. (Editors)

**Advances in virus research. Volume 1.** Academic Books Ltd., London 1953: \$8.00 : Pp. xi + 362 : figs. : tables.

The Academic Press has brought out a useful addition to their well-known series of "Advances" and the first volume of *Advances in Virus Research* has now appeared. It is intended that a volume should appear annually; the editors are K. M. Smith and M. A. Lauffer. The emphasis of the reviews is on the viruses themselves and not on the diseases they cause. There are eight review articles in the present volume. In The properties of bacteriophages, H. T. Epstein provides a useful summary of the scattered information on bacteriophages. Of special interest is the discussion on the differently shaped ultraviolet-survival curves of the different coliphages and on the use of radioactive tracers for studying organic synthesis in the phages. Plant breeders will be particularly interested in the short review of phage genetics. C. W. Bennett, in Interactions between viruses and virus strains, deals principally with antagonism between unrelated viruses and interference between different strains of the same virus. This article is confined to plant viruses. The next paper, Transmission of plant viruses by cicadellids, is by L. M. Black. Among the topics discussed are multiplication of viruses in the vector, vector range, the genetics of capacity to act as vector, host resistance and selective feeding preferences of the vectors.

The next four papers are concerned with animal viruses and clinical problems. G. H. Bergold writes on Insect viruses, W. Henle on Multiplication of influenza virus in the endometrial cells of the allantois of the chick embryo, J. L. Melnick on Poliomyelitis, and D. G. Sharp on Purification and properties of animal viruses. The last paper, Virus nucleic acids, by R. Markham, is biochemical and provides a useful review of present knowledge of the different types of nucleic acids identified from plant and

animal viruses and from bacteriophages, the connexion between nucleic acid and the virus protein, and the possible biological significance of virus nucleic acids.

MÜLLER, P.

DDT. Das Insektizid Dichlordiphenyltrichloräthan und seine Bedeutung. (DDT. The insecticide dichlorodiphenyltrichloroethane and its significance).

Birkhäuser Verlag Basel & Stuttgart 1955 : bound Fr. 37.50 (DM 37.50) : unbound Fr. 33.30 (DM 33.30) : Pp. 299 : figs. : tables.

The insecticide DDT, first produced by the firm of Geigy in Basel in 1939, has now become a household word throughout the world and it is singularly appropriate that this monograph on the subject should emanate from the same town. It is comprised of a series of chapters, each contributed by an acknowledged international authority on the respective subject. Some of the chapters are written in German and some in English but in each case a summary in the other language is provided. Starting with an historical introduction, the first part covers the physics and chemistry of DDT, its mode of action and methods of application for various purposes, including the textile industry and forestry. A second volume is to appear in 1956 dealing with pharmacology and the use of DDT in human medicine and a third is planned for 1956/57 and will be devoted to DDT in plant protection and the prospects for the further development of its application.

The first volume maintains the usual high standards of the Birkhäuser Verlag.

30e beschrijvende rassenlijst voor landbouwgewassen 1955. (Thirtieth descriptive list of agricultural crop plants, 1955).

Rijkscommissie voor de Sammenstelling van de Rassenlijst voor Landbouwgewassen, Wageningen 1955 : Pp. 328 : tables.

The thirtieth edition of this valuable reference book has now been published, together with its English commentary (cf. p. 104 above). In addition to comprehensive data on the principal varieties of agricultural crops approved for cultivation in the Netherlands, information is provided on the procedure followed in testing and certifying new varieties. Appendices giving English, French and German translations of Dutch words for the different crop plants, synonyms and equivalents of varietal names and

statistical data on the distribution of varieties in different areas and on different types of soil are also provided.

HAYES, H. K., IMMER, F. R. & SMITH, D. C.

Methods of plant breeding.

McGraw-Hill Publishing Co., Ltd., London 1955 : 2nd ed. : 61s. : Pp. vii + 551 : 63 figs. : 102 tables.

The first edition of this book (cf. *PBA*, Vol. XIII, p. 95) has for over ten years been the standard manual on plant breeding. During this time many developments have taken place and in the new edition, though much of the original text has been maintained, some parts have been rewritten and several entirely new sections have been added. Thus the opening chapter now appropriately contains an account of the centres of origin of crop plants, based mainly on the work of Vavilov. A new chapter has been added to deal with heterosis; more discussion of the problem of biotypes appears in the chapter on breeding for disease resistance, which now includes resistance to insects and nematodes; a chapter on special techniques of testing such properties as quality, cold resistance, lodging and shattering, and for using colchicine, male sterility and monoploids has been added; and the range of crops has been extended to include cotton, sorghum, sugar beet, sugar cane, forage crops and several other cross-pollinated plants.

One of the two original authors, Dr. F. R. Immer, died in 1946 and Dr. D. C. Smith has collaborated with Dr. Hayes in the preparation of this new edition; it will undoubtedly prove a worthy successor to the first, which has served as a guide to so many budding plant breeders in the past twelve years.

KAPPERT, H. & RUDOLF, W. (Editors) Handbuch der Pflanzenzüchtung. (Manual of plant breeding).

Paul Parey, Berlin & Hamburg 1955 : 2nd Ed. : Vol. 1 : Lief. 1 : Bogen 1-5 : 1-80 : 39 figs : 2 tables : DM 13.50.

One of the two editors of the first edition of the *Handbuch der Pflanzenzüchtung* (cf. *PBA*, Vol. XXI, p. 712), Dr. T. Roemer, died in 1951 and for the second edition his place has been taken by Dr. H. Kappert; in addition to this the co-operation of two assistant editors, Dr. H. K. Hayes in the USA and Dr. A. Müntzing in Sweden, has been enlisted. The second edition is therefore such only in name and will in fact constitute an entirely new work, covering a wider and more international field than the



first, and at the same time bringing the field previously covered more up to date. The full Manual will comprise six volumes, the first of which is to be devoted to basic principles of plant breeding; later volumes will deal with cereals, roots, forage plants, various special crops and horticultural plants respectively; there will also be a supplement on forest-tree breeding.

The Manual is to be issued at monthly intervals, each instalment or *Lieferung* comprising some 80 pages and costing DM 13.50; there will be about 38 instalments in all; a 10% increase in price will become operative after the appearance of the final instalment. The first instalment, which now appears, comprises *Biologisch-genetische und physiologische Grundlagen der Züchtung* [Biogenetic and physiological bases of breeding] by H. Kappert, which deals with questions of form diversity and its causes in wild and cultivated material, and the first part of *Fortpflanzung und Vererbung* [Reproduction and inheritance] by Å. Gustafsson and A. Nygren, in which various types of reproduction met with in the higher plants are described.

The Manual conforms to the high standards of printing and production that we have come to associate with works published by the Paul Parey and other German presses. The only real defects are in the bibliography at the end of the first chapter, where Hiesey for instance appears consistently as Hisey and there is a certain lack of uniformity in the citation of the journals.

BROUWER, W. & STÄHLIN, A.  
*Handbuch der Samenkunde. (Seed handbook).*

DLG-Verlags-Gesellschaft m.b.H., Frankfurt am Main 1955 : DM 96,40 : Pp. 656 : 1672 illus.

To bring together under one cover all pertinent knowledge of the characteristics of the seeds of agricultural plants and their principal weeds is no mean task and for undertaking it the authors of this manual will have earned the gratitude of all who have to do with seeds, that is, botanists and plant breeders as much as seed merchants, specialists in seed-testing laboratories and seed certifiers. After a general botanical description of the different types of fruit and seeds found in angiosperms and gymnosperms, we are given a general account of the family Acanthaceae, with special attention to the characters of fruit and seeds; the individual species are then described, with information on their common names in German and English, dimensions and morpho-

logical characteristics of the seeds, place in agriculture or horticulture and geographical distribution; common synonyms are indicated and the seeds are illustrated by diagrams. Next come the Aceraceae and other families follow in alphabetical order of their Latin names, terminating with the Zygophyllaceae. A dichotomous key for identification of the species on the basis of seed characters comes next and the volume is completed by a short bibliography and an alphabetical index of the species names in Latin, German and English, the English names being printed in italics for convenience of distinction from the German. As in all works of this kind, some of the English "common names" are rather quaint, and one cannot but deprecate an excessive tendency towards hyphenation, which even goes as far as Indian-Mustard, Sensitive-plant and Evening-primrose; some of the spellings are unconventional, for instance lucern, cassave, myrobalana-plum, damason-Plum, and others conform exclusively to the American usage, such as lupine and peanut; however in other cases both English and American equivalents are given and in general the standard of accuracy of the work is uncommonly high, as are the printing and general presentation.

MERRILL, E. D.

**The botany of Cook's voyages.**

Chronica Botanica Co., Waltham, Mass.,  
USA 1954 : 14 : No. 5/6 : \$4.75 : 164-384 :  
22 figs. : 13 plates.

While in London during 1951, engaged upon research in connexion with the Roxburgh collections of botanical specimens from India and Malaysia, Prof. Merrill took the opportunity of examining the collections made by Banks and Solander in the Pacific Islands during Cook's first voyage round the world (1768-71) and comparing them with the unpublished descriptions compiled by Solander. He also checked various collections made among the Pacific Islands by the two Forsters, father and son, during Cook's second voyage, and studied a number of Hawaiian specimens obtained on the third voyage. From his reconstruction of the botanical picture from these collections and other evidence he reached the main conclusion that no cultivated plant of New World origin, with the possible exception of the sweet potato, and no weed species of New World origin, with two or three possible exceptions, had become established on the Pacific Islands prior to the beginning of the period of European exploration. Allowing the possibility of only rare

trans-Pacific communication in pre-Columbian and pre-Magellan times, Prof. Merrill is strongly critical of most diffusionist theories, arguing that they have been conceived in botanical ignorance or in neglect of such vital considerations as difficulties in early transportation, the role of the early trade routes of the Portuguese, Spanish and other European nations, the early distribution of weeds and the evidence to be culled from historical documents.

Concerning the three cultivated plants, viz. the sweet potato, coconut and gourd (*Lagenaria*), which, it is generally agreed, were present in both hemispheres prior to European explorations and which provide the main support for diffusionist theories, Prof. Merrill comes to the following conclusions. Although the sweet potato may have originated in South America, its origin by hybridization in Africa is thought to be more probable, the species being transmitted by man across the Atlantic to the New World perhaps a few centuries before the arrival of Columbus, and eastward, by way of Madagascar and the islands of the Indian Ocean, to southern Malaysia, Papuasias and Polynesias, finally reaching possibly even South America. It is stated that there is "no satisfactory proof as yet" and the "increasing amount of evidence" in favour of this hypothesis is not enlarged upon. The coconut, considered to be of oriental origin, was established on the west coast of Panama and possibly further south along the coast before the arrival of the Spaniards but was absent from the Atlantic basin until the Portuguese introduced it from the east; it may have reached the west coast of the American continent by floating or as the result of Polynesian voyages. The gourd, used mainly for containers and utensils, probably originated in Africa; it is regarded as being mainly distributed by man within either hemisphere but no satisfactory answer to the question of how it reached the American continent can yet be given, in spite of the results of floating experiments. In discussing the geographical origin and distribution of many other cultivated species, Prof. Merrill attaches much importance to the part played by the old Portuguese trade route from Lisbon via Brazil and the Cape of Good Hope to Goa and other parts of the east, suggesting, for instance, that maize, *Cucurbita* spp. and the groundnut were introduced from South America into Asia by way of this route. He further suggests that this Portuguese route was instrumental in the introduction of Asiatic cotton for the first time into the New World. This idea is voiced in the additional notes at the end

of the book; no attempt is made to work out its evolutionary and genetical implications.

This work is an important advance in the study of the origin and distribution of cultivated crops. Those who may disagree with the author on certain points or find the mode of presentation confused and repetitive at times will surely agree with his emphatic warning that theories concerning the history of plants should be based on really adequate knowledge of all the aspects involved: botanical, genetical, anthropological, archeological, historical, geographical and philological.

RUSMINI, B.

I cereali. (**The cereals**).

Antonio Vallardi Editore 1954 : Pp. 128 : 30 figs. : tables.

In spite of its modest size this small booklet gives a fairly comprehensive outline of the systematics of the cereal species that are grown in Italy. Starting with wheat, there are descriptions of the main varieties grown, with indications of their origin and main morphological and biological characteristics. A succinct account is given of the methods of plant breeding and of the chief results obtained in the last half century and information is presented concerning methods of cultivation and utilization and the main diseases and pests. The maize section includes an account of how hybrid corn is produced. The other cereals, which receive less extensive treatment, include sorghum and millet and a brief description of buckwheat completes the booklet.

WILSON, H. K.

**Grain crops.**

McGraw-Hill Book Company, Inc., London 1955 : 2nd ed. : 49s. : Pp. ix + 396 : 117 figs. : 54 tables.

The first edition of this text book for American students was published in 1948. The second edition now appearing has been revised to bring it more in line with advances in research and practice and more up to date in the statistics quoted and in other ways. A new chapter, Soils for grain crops, has been added and the succeeding chapter, the culture of grain crops, which dealt with the subject of soils in the first edition, has been correspondingly altered. The chapter on sorghum, originally contributed by R. L. Cushing, has been modified and shortened by H. H. Laude. The text of the final chapter on breeding has not been revised so as to mention any of the more interesting developments in recent years. A number of photographs and diagrams have been added and some



omitted. The criticisms raised in the review of the first edition still apply (cf. *PBA*, Vol. XVIII, p. 831).

• GRIST, D. H.

**Rice.**

Longmans, Green & Co., London 1955 : 2nd ed. : 35s. : Pp. xix + 333 : 68 plates : 17 tables : 34 figs.

The first edition of this book was reviewed in *PBA*, Vol. XXIV, p. 143. In the present volume a number of small corrections and amendments making for clarity have been made in the main body of the text, and the cursory treatment afforded to rice breeding in the first edition has been partly remedied by the addition of a second appendix, entitled "The improvement of yield by hybridization," in which the aims and methods of the FAO scheme for hybridization between *japonica* and *indica* varieties are outlined. These improvements, together with the inclusion of some additional references in the bibliography, enhance the value of what was already a useful and informative work.

HITCHCOCK, C. L.

**A revision of the North American species of *Lathyrus*.**

University of Washington Publications in Biology. Volume 15. University of Washington Press, Seattle, 1952 : Pp. 104 : figs. : tables : maps.

Although a few papers dealing with the taxonomy of small groups of *Lathyrus* species in the USA have been published during the past 40 years, this is the first comprehensive treatment to appear since T. G. White's revision of the North American representatives of the genus in 1894, and is, therefore, a welcome contribution to our knowledge of the genus as a whole. The present work is based mainly on results of field and herbarium studies, but cytotoxicomic investigations are in progress with a view to solving some of the problems raised by the rather free intercrossing that apparently occurs among many species. A list of the chromosome counts that have so far been made in American species is included, most of the species being diploid, with  $2n = 14$ , and a few tetraploid. In addition, the results of a number of successful and unsuccessful attempts at artificial hybridization are expressed in diagrammatic form at the end of the contribution.

After a consideration of the morphological characters of taxonomic significance, which in Norther American *Lathyrus* species are chiefly

the vegetative characters, the relationships of the species are briefly discussed, with particular reference to the degree of natural hybridization occurring among them. The main body of the work then follows, constituting a description of the genus, an artificial key, and detailed descriptions of the 39 individual species recognized as distinct. These include a number of introductions from Europe and Central America and two new species, *L. delnorticus* from California and *L. zionis* from Utah. Several of the species described by earlier authors are here relegated to subspecific or, in a few cases, varietal rank. The monograph is illustrated with a set of delicately precise line drawings of the salient features of all the species, subspecies and varieties described in the text and concludes with a series of distribution maps and an index.

**The mango. A souvenir.**

Department of Agriculture, Hyderabad [undated] : Pp. 121 + 11 : figs. : tables : plates.

Containing twenty-eight articles on various aspects of mango production in India, this souvenir publication has been compiled in connexion with an annual mango exhibition in Hyderabad, Deccan, and with the aim of arousing popular interest in the fruit and its many uses. The contributions from the different writers often overlap to some extent, with the result of repetitiveness, and from the point of view of subject matter the sequence of the articles could have been better chosen, but the souvenir certainly provides much information of interest and is a useful addition to the general literature on the mango. The contributions deal with the history, propagation, cultivation, pest and disease control, economics and marketing of the mango, particularly in Hyderabad State. The local varieties in different parts of India are referred to, often in detail, and the limited amount of breeding so far carried out is outlined. An extensive collection of mango varieties from all parts of India and from other countries is being assembled at the Fruit Research Station, Sangareddy, Hyderabad State. This region offers particularly favourable edaphic and climatic conditions for such a project and the establishment of a Central Mango Research Station in the State is advocated. For those especially interested in varieties the concluding guide to the identification of a total of 127 mangoes provides a convenient source of information. A number of coloured plates give some idea of the great diversity of this important fruit.

HEGER, A.

Lehrbuch der Forstlichen Vorratspflege.  
(Text book on stock tending in forestry).

Neumann Verlag, Radebeul und Berlin  
1955 : Pp. 204 : figs. : tables.

The author maintains that most of the German forests are producing less than their potential yield owing to the failure to apply proper care during the growing period; a system of thinning which removes inferior material and encourages the development of the best trees constitutes one of the many principles of rational forest management laid down in this text book. The principles of tending to be applied at different developmental stages are treated in turn and different types of forest—beech, spruce, pine or mixed—are considered separately. A large number of different systems of thinning are described and their purposes explained and a final chapter, specially written by Prof. Dr. H. Schönbach, is devoted to forest-tree breeding and genetics. Here the principles of selection are expounded, evidence is presented for the heritability of characters such as growth form, branching, form of crown, bark thickness and type, growth rate, time of vegetation and of fructification, and resistance to damage by diseases, pests and unfavourable climatic factors. Thus the stock-tending measures described in the earlier sections of the book are shown to contribute not only to the temporal improvement of a given stand but to be a form of forest-tree breeding designed to improve the race. The advantages of this method over clear felling and replanting with improved stock are discussed and it is decided that the choice will vary according to circumstances. The book as a whole however lays particular emphasis on the advantages of mixed forests maintained in an organic condition approximating to that of a natural forest, rather than pure stands of any one species or race. The importance of source of seed is stressed and the merits of various forms of artificial selection are discussed; finally data are mentioned which show that vigour, yield and wood density are dependent not only on phasic condition but are hereditary characters which can also be improved by breeding.

#### Mushroom growing.

Bulletin of the Ministry of Agriculture and Fisheries No. 34. HM Stationery Office, London 1954 : 5s. : Pp. iv + 79 : plates : tables : figs.

Of the many publications on mushrooms which,

as a symptom of the growing popularity of mushroom cultivation, have appeared in ever-increasing numbers in recent years, there can be few which are as concise, lucid and informative for so modest a price as this small bulletin. Essentially a practical handbook, its first few chapters provide an exposition of the routine operations involved in indoor and outdoor mushroom culture together with information on the construction of mushroom houses and on methods of preparation for market, while the later chapters describe, with admirable brevity and clarity, the numerous pests and diseases to which mushrooms are subject and the appropriate methods of control. Since the fifth edition in 1950, considerable advances in the technique of mushroom growing have been made and, in accordance with its aim of acquainting the reader "with the most recent developments resulting from experimental work in this country and abroad," this edition incorporates much new matter, including appendices on the tray system introduced from America, and on the synthetic composts developed by the Mushroom Research Association at Yaxley, Peterborough. A bibliography of some 120 titles and an index complete a booklet which will, like its earlier editions, be useful to beginner and experienced grower alike.

## NEW JOURNALS

### *Agricultural Review, London.*

The chief aim of the *Agricultural Review*, which has as its editor Sir James Scott Watson, is to help the progressive farmer to keep abreast of scientific information. In addition to articles by acknowledged authorities in the many fields of agricultural sciences, long-term trends of demand and supply are to be analysed as an aid in the planning of production. Information will also be included on advances in the study of farm management and horticulture. It is hoped that not only will farmers in western Europe be readers of the journal but also those working in broadly similar environments in North and South America, Australia and New Zealand. The *Agricultural Review* therefore helps to fill the gap made by the cessation of publication of the *British Agricultural Bulletin*. In the first number, an article on sugar beet breeding by P. S. Hudson is of particular interest (cf. Abst. 3272). Published monthly by the Hulton Press Ltd., 43 Shoe Lane, London, E.C.4, the review is priced at 2s. 6d. per copy.



**Alexandria Journal of Agricultural Research.**

The first number of this journal, published by the Faculty of Agriculture, University of Alexandria, Egypt, contains articles contributed by members of various departments in the university. The subjects treated include a study of the effects of inbreeding in *Drosophila*, the results of trials of American maize hybrids (cf. Abst. 3042), germination in *Orobancha crenata*, investigations into the inheritance of earliness and rust reaction in wheat (cf. Absts. 2907 and 2950) and researches on polyembryony in *Citrus* (cf. Abst. 3368), as well as other topics

of agricultural interest. The papers are in English with summaries in Arabic.

**Virology.**

With G. K. Hirst as editor-in-chief, *Virology* contains papers on the biological, biochemical and biophysical aspects of virus research and is mainly a forum for the examination of fundamental problems rather than those of an applied nature. Volume I, 1955, consisting of five numbers, is priced at \$9.00. The journal is published by the Academic Press Inc., New York 10, NY.



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**Other Publications:**

JOINT PUBLICATIONS		s.	d.	TECHNICAL COMMUNICATIONS—continued.		s.	d.
No. 1. Vernalization and Phasic Development of Plants .. .. .	10	0		14. Technique of Breeding for Drought Resistance in Crops, by Miss T. Ashton	2	6	
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No. 5. The Production of Seed of Root Crops and Vegetables .. .. .	5	0		16. The Theory and Practice of the Back-cross Method in the breeding of Non-cereal Crops, by Mrs. M. Thomas ..	15	0	
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5. The South American Potatoes and their Breeding Value .. .. .	3	6		Issue No. 8 .. .. .	6	0	
6. The Action and Use of Colchicine in the Production of Polyploid Plants, by J. L. Fyfe .. .. .	1	6		INDEXES			
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9. Potato Collecting Expeditions in Mexico and South America. II. Systematic Classification of the Collections, by J. G. Hawkes .. .. .	7	6		Subject Index to Vols VI to VIII of Plant Breeding Abstracts .. .. .			
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11. Cultivation and Breeding of Russian Rubber-bearing Plants .. .. .	2	6		BIBLIOGRAPHICAL MONOGRAPHS			
12. The New Genetics in the Soviet Union, by P. S. Hudson and R. H. Richens .. .. .	6	0		Breeding varieties resistant to disease. (1930) .. .. .			
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